

SOIL SURVEY

Sunflower County Mississippi



UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
MISSISSIPPI AGRICULTURAL EXPERIMENT STATION

HOW TO USE THE SOIL SURVEY REPORT

THIS SURVEY of Sunflower County will help you plan the kind of farming that will protect your soils and provide good yields. It describes the soils; shows their location on a map; and tells what they will do under different kinds of management.

Find Your Farm on the Map

In using this survey, start with the index to map sheets in the back of this report. This is a small map of the county on which numbered rectangles have been drawn to show where each sheet of the large map is located. The sheets of the large map, if laid together, make a large photograph of the county. You can see woods, fields, roads, rivers, and many other landmarks on this map.

When you have found the map sheet for your farm, you will notice that boundaries of the soils have been outlined and that there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they appear on the map.

Suppose you have found on your farm an area marked with the symbol Ab. You learn the name of the soil this symbol represents by looking at the map legend. The symbol Ab identifies Alligator clay, nearly level phase.

Learn About the Soils on Your Farm

Alligator clay, nearly level phase, and all the other soils mapped are described in the section, Descriptions of Soils. Soil scientists walked over the fields and through the woodlands. They dug holes and examined surface soils and subsoils; measured slopes with a hand level; noted differences in growth of crops, weeds, brush, or trees; and, in fact, recorded all the

things about the soils that they believed might affect their suitability for farming. They drew lines on the aerial photographs to show the boundaries of the soils.

After they mapped the soils, the scientists consulted farmers and others who work with farmers, and then they placed soils in capability units. A capability unit is a group of similar soils that need and respond to about the same kind of management and that require similar protection from erosion.

For example, Alligator clay, nearly level phase, is in capability unit 11 (IIIa-4). Turn to the section, Management of Soils, and read what is said about soils of unit 11 (IIIa-4). You will want to study the table, which tells you how much you can expect to harvest from soils of each unit under two levels of management. In columns A are yields to be expected under prevailing management; and in columns B are yields to be expected under improved management.

Make a Farm Plan

For the soils on your farm, compare your yields and farm practices with those given in this report. Look at your fields for signs of runoff, erosion, or poor drainage. Then decide whether or not you need to change your methods. The choice, of course, must be yours. This survey will aid you in planning new methods, but it is not a plan of management for your farm or any other farm in the county.

If you find that you need help in farm planning, consult the local representative of the Soil Conservation Service or the county agricultural agent. Members of the staff of your State agricultural experiment station and others familiar with farming in your county will also be glad to help you.

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SOIL SURVEY OF SUNFLOWER COUNTY, MISSISSIPPI

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General Nature of the Area

Sunflower County, in northwestern Mississippi, is almost in the center of the Mississippi River flood plain area of the State. The almost level land, mostly fertile alluvium deposited by the Mississippi River, is used principally for farming. Cotton has long been the main crop, but since 1940 there has been a definite increase in acreage of pasture, small grains, soybeans, and rice. Acreage controls on cotton, increased cost of growing the crop, and shortage of labor have encouraged the trend to other crops. Migration of farm labor to industry has been partly offset by mechanization.

Because of improved management of pasture and use of grasses new to the area, the number of cattle in the county has more than doubled since 1950. Most of the increase has been in good grade beef herds, which are grazed on pasture almost the year round (fig. 1).



Figure 1.—Excellent permanent pasture on an irregular bayou slope.

This survey of Sunflower County was made cooperatively by the United States Department of Agriculture and the Mississippi Agricultural Experiment Station. Residents of the county recognized a need for a soil survey in 1945 and voted a tax appropriation to pay for part of the cost.

Location and Extent

Sunflower County, located in the northwestern part of Mississippi, is bordered by Coahoma County on the north, by Tallahatchie, Leflore, and Humphreys Counties on the

east, by Humphreys and Washington Counties on the south, and by Washington and Bolivar Counties on the west (fig. 2). It covers 693 square miles and ranges

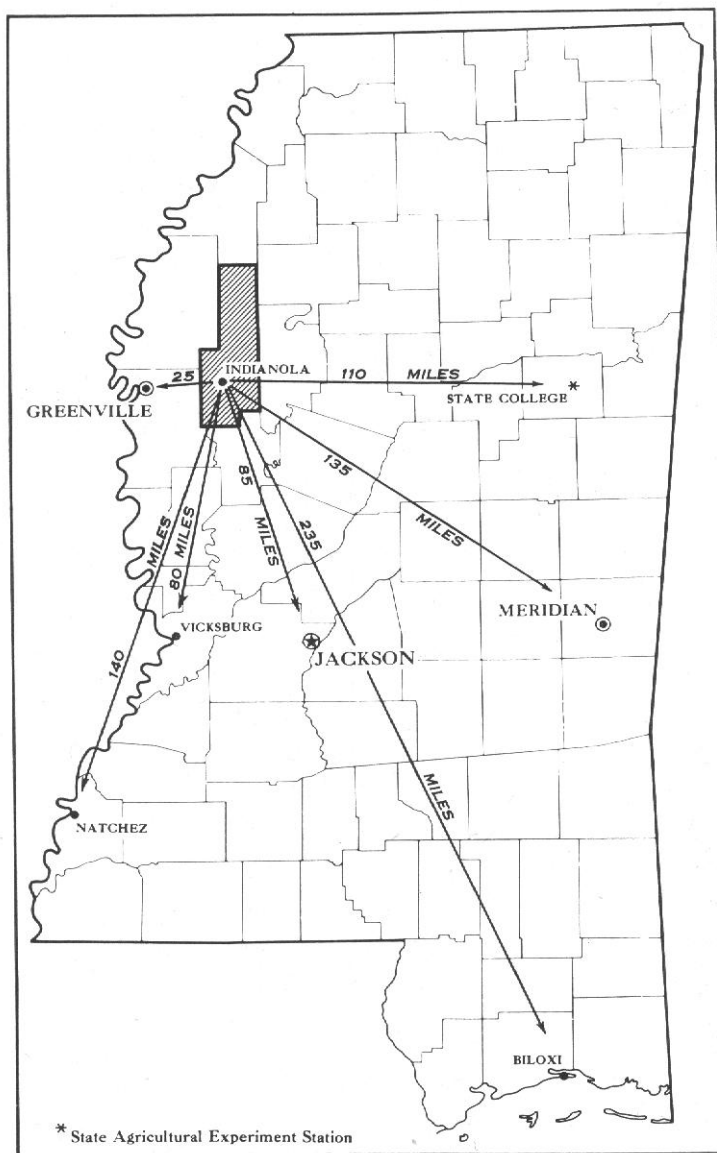


Figure 2.—Location of Sunflower County in Mississippi.

¹ Fieldwork for this survey was done when Soil Survey was part of the Bureau of Plant Industry, Soils, and Agricultural Engineering. Soil Survey was transferred to the Soil Conservation Service on November 15, 1952.

from about 24 to 50 miles long to about 12 to 18 miles wide. Indianola, the county seat, is located at the junction of United States Highways 82 and 49W, in the south-central part of the county. The county is drained by the Big Sunflower, Hushpuckena, and Quiver Rivers and by many smaller streams and bayous.

Physiography, Relief, and Drainage

Sunflower County lies entirely within the Mississippi River flood plain, which is a broad valley floor that was once subject to stream overflow. Most of the county is between 100 and 150 feet above sea level, and the elevation becomes lower toward the south. The elevation at Rome in the northern part of the county is 145 feet; at Ruleville in the central part of the county, it is 135 feet; and at Inverness in the southern part, it is 115 feet.

The relief is level to sloping, but much of the land is level or nearly level. Some parts of the county are well drained, but others need much artificial drainage. Areas have been drained recently, especially in the slack-water areas. The Sunflower River meanders more than 100 miles within the county. This river pattern, with its tributaries and former channels, determines the generally southward natural drainage of the county. The Quiver and the Hushpuckena Rivers both empty into the Sunflower River.

One fairly small area east of Inverness, near the county line, is still flooded at times by the Yazoo River that is southeast of the county. Among the many bayous in this county are the Black, Blackhaw, Browns, Darr, Dougherty, Dawson, Fox, Jones, Locust, Moorhead, Mound, Pecan, Porter, Powell, Shepherds, Short, Standing Stump, Wild Bill, and the east and west sections of Indian Bayou. Some of the lakes in the county are Bay, Beasley, Cat, Dawson, Jenkins, Jug, Macon, McCoy, Melton, One Mile, Shackelford, Six Mile, Swede, Thighman, Three Mile, and part of Six Mile Lake.

Climate

Sunflower County has a warm-temperate climate. Summers are hot and humid, but winters are mild. Normal temperatures and rainfall for the county are given in table 1. The average frost-free season is approximately 221 days, extending from about March 26 in the spring to about November 2 in the fall.

Dry periods are common during the middle and latter part of the growing season. In recent years corn, soybean, and hay crops were affected by the dry weather. Heaviest precipitation comes in the winter and spring, from December through April. In some years the wet soils may delay spring planting.

During the long growing period occasional thunder-showers bring temporary relief from the humid heat of summer.

Bright sunshine and high temperatures are typical in summer. Most of the hay crops are cut and cured during the dry summer and fall months. Winters have much cloudy weather, which is usually followed by cool weather and some frost for short periods. Nevertheless, the winters are mild enough to allow continued growth of

small grains and some legumes throughout the season. Infrequent winter storms with strong winds, hail, and ice may damage trees and wires.

TABLE 1.—*Temperature and precipitation at Moorhead, Sunflower County, Miss.*

[Elevation, 117 feet]

Month	Temperature ¹			Precipitation ²			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1936)	Wettest year (1919)	Average snowfall
December.....	46.8	85	4	6.21	4.45	5.00	0.5
January.....	46.0	83	-1	4.86	4.45	4.40	.4
February.....	49.1	89	13	4.09	3.02	3.31	.3
Winter.....	47.3	89	-1	15.16	11.92	12.71	1.2
March.....	56.3	90	20	5.33	3.18	9.77	.4
April.....	63.9	94	28	5.18	4.45	7.33	0
May.....	71.9	97	38	4.58	1.27	11.92	0
Spring.....	64.0	97	20	15.09	8.90	29.02	.4
June.....	79.6	103	47	3.86	1.40	2.80	0
July.....	81.7	110	54	4.12	2.96	3.65	0
August.....	81.0	106	54	3.29	.73	5.55	0
Summer.....	80.8	110	47	11.27	5.09	12.00	0
September.....	76.3	108	35	2.55	(³)	.60	0
October.....	65.1	97	23	2.50	1.07	9.87	0
November.....	53.6	85	14	3.80	4.20	10.31	.2
Fall.....	65.0	108	14	8.85	5.27	20.78	.2
Year.....	64.3	110	-1	50.37	31.18	74.51	1.8

¹ Average temperature based on a 43-year record, through 1955; highest temperature on a 17-year record and lowest temperature on an 18-year record, through 1930.

² Average precipitation based on a 43-year record, through 1955; wettest and driest years based on a 36-year record, in the period 1914-1955; snowfall based on a 16-year record, through 1930.

³ Trace.

Vegetation

When the first permanent settlements were made, Sunflower County was entirely covered with forests consisting mostly of broadleaf deciduous trees. Cypress was the only native conifer. Where light penetrated the forest canopy, dense clumps of cane and vines grew.

Most of the county has been cleared. Only a few small, cutover, wooded areas remain. Many trees in these areas are culls or of low quality because of haphazard cutting, fires, and similar abuses. Some open, cutover, and fire-razed areas are overgrown with rank weeds, vines, and brush.

The following fairly distinct forest types, shown in table 2, are recognized in the county today: Sweetgums and water oaks; white oaks, red oaks, and other hardwoods; hackberry, elm, and ash; overcup oak and bitter pecan; willow; and cypress and tupelo-gum.

TABLE 2.—*Types of forest trees in Sunflower County (5)*¹

Type	Important species	Location	General characteristics
Sweetgum and water oaks.....	Sweetgum. Water oak. Nuttall oak. Willow oak. Soft elm. Hackberry. Green ash.	Normally slack-water flats and level and nearly level old natural levees.	Most widely distributed type; second in quality; produces valuable factory lumber and logs for veneer.
White oaks, red oaks, and other hardwoods.	Cow oak. Delta post oak. Cherrybark oak. Shumard oak. Southern red oak. Hickory. White oak. White ash.	Normally on coarser textured soils of the old natural levees.	Highest quality type, and most valuable; second in distribution to sweetgum—water oaks type; produces high-quality barrels, factory lumber, and logs for veneer.
Hackberry, elm, and ash.....	Hackberry. Soft elm. Green ash. Bitter pecan. Willow oak.	Normally on low ridges, flats, and sloughs.	Widely distributed second growth after heavy cutting and fire; produces mainly low-quality shipping barrels, lower grade factory lumber, logs, and box factory logs.
Overcup oak and bitter pecan.....	Overcup oak. Bitter pecan. Willow oak. Hackberry. Waterlocust. Persimmon. Soft elm. Green ash.	Normally on low, poorly drained slack-water flats; lowest back-water basins; sloughs; and low fine-textured ridges.	Widely distributed; varies in quality from poor to medium.
Willow.....	Willow. Cottonwood. Green ash. Cypress. Hackberry. Waterlocust.	Normally in shallow and deep depressions, and in swamps.	Very rapid growth; excellent quality makes it of moderate value for factory lumber, logs, and pulpwood when it grows on front land. Usually poor quality and form in other locations make it of little value.
Cypress and tupelo-gum.....	Cypress. Tupelo-gum. Swamp blackgum. Willow. Waterlocust. Soft elm. Bitter pecan.	Normally in level very low slack-water flats, deep sloughs, and swamps.	Widely distributed in small areas; growth is slow, but it produces lumber of good quality.

¹ Italic numbers in parentheses refer to Literature cited, p. 42.

Wildlife

Sunflower County has range, feed, and water for abundant wildlife. About 50,000 acres is in cutover forest; 2,700 acres is in swamp or forest land covered with water most of the year; 4,500 acres is in rivers, lakes, and ponds; and 2,200 acres is in bayous, shallow lakes and ponds, and similar areas intermittently covered by water. Oats, soybeans, corn, hay, and pasture on the farmlands are additional sources of food and shelter.

A few deer range in the county. The main small game animals are gray and fox squirrels and cottontail and swamp rabbits. The furbearers are opossum, raccoon, weasel, mink, otter, striped skunk, and muskrat. The predators are gray fox and bobcat.

The most numerous game birds are bobwhite and mourning dove. Present during winter migration, but not necessarily during open season, are wild geese and many kinds of pond and diving ducks.

Game is protected by laws administered by the State.

Management of Soils

This section does four main things. It explains the system the Soil Conservation Service uses in grouping soils according to their capability; it places the soils of Sunflower County in capability units or, as they are sometimes called, management groups; it provides estimated ranges in yield for principal crops under common and improved management; and, finally, it points out characteristics of the soils worth special consideration in irrigating, in draining, or in other ways controlling water on the land. Additional information about management of mapping units—the single soils shown on the detailed map—will be found in the section titled *The Soils of Sunflower County*.

Capability Grouping

Capability grouping is a system of classification used to show the relative suitability of soils for crops, grazing,

forestry, and wildlife. It is a practical grouping based on the needs, limitations, and risks of damage to the soils, and also their response to management. There are three levels above the mapping unit in the grouping—unit, subclass, and class.

The capability unit, sometimes called a management group, is the first level of grouping. A capability unit is made up of soils similar in kind of management they need, in risk of damage, and in general suitability for use.

The next broader grouping, the subclass, is used to indicate the dominant kind of limitation. The letter symbol "e" indicates that the main limiting factor is risk of erosion if the plant cover is not maintained; "w" means excess water that retards plant growth or interferes with cultivation; and "s" shows that the soils are shallow, droughty, or unusually low in fertility.

The broadest grouping, the land class, is identified by Roman numerals. All the soils in one class have limitations and management problems of about the same degree, but of different kinds, as shown by the subclass. All the land classes except class I may have one or more subclasses.

In classes I, II, and III are soils that are suitable for annual or periodic cultivation of annual or short-lived crops. Class I soils are those that have the widest range of use and the least risk of damage. They are level, or nearly level, productive, well drained, and easy to work. They can be cultivated with almost no risk of erosion and will remain productive if managed with normal care.

Class II soils can be cultivated regularly, but do not have quite so wide a range of suitability as class I soils. Some class II soils are gently sloping; consequently, they need moderate care to prevent erosion. Other soils in class II may be slightly droughty or slightly wet or somewhat limited in depth.

Class III soils can be cropped regularly but have a narrower range of use. These need even more careful management.

In class IV are soils that should be cultivated only occasionally or only under very careful management.

In classes V, VI, and VII are soils that normally should not be cultivated for annual or short-lived crops, but they can be used for pasture and range, as woodland, or for wildlife.

Class V soils are nearly level and gently sloping but are droughty, wet, low in fertility, or otherwise unsuitable for cultivation.

Class VI soils are not suitable for crops because they are steep or droughty or otherwise limited, but they give fair yields of forage or forest products. Some soils in class VI can, without damage, be cultivated enough so that fruit trees or forest trees can be set out or pasture crops seeded.

Class VII soils provide only poor to fair yields of forage or forest products.

In class VIII are soils that have practically no agricultural use. Some of them have value as watersheds, wildlife habitats, or for scenery.

None of the soils of these last four classes occur in Sunflower County.

The capability classes, subclasses, and units in Sunflower County are given in the following list. Following the list there is a description of each capability unit, the soils that are in it, and some suggestions about how to use and manage these soils.

Class I.—Soils that have few limitations in use.

Unit 1 (I-1): Nearly level mostly moderately well drained loamy soils.

Unit 2 (I-2): Nearly level well-drained very fine sandy loam.

Class II.—Soils moderately limited for use as cropland.

Unit 3 (IIe-1): Gently sloping mostly moderately well drained loamy soils on old natural levees.

Unit 4 (IIe-4): Gently sloping moderately well drained and somewhat poorly drained silty clay loam.

Unit 5 (IIs-1): Well-drained to somewhat excessively drained sandy loams on old natural levees.

Unit 6 (IIs-2): Nearly level somewhat poorly drained acid clayey soil that is rather difficult to work.

Unit 7 (IIs-3): Somewhat poorly and poorly drained loamy soils on old natural levees.

Unit 8 (IIs-4): Somewhat poorly and poorly drained silty clay loams.

Unit 9 (IIs-6): Moderately well drained to somewhat poorly drained silty clay loam.

Unit 10 (IIw-3): Level or nearly level somewhat poorly drained loamy soils in shallow depressed areas.

Class III.—Soils severely limited but suitable for regular use as cropland.

Unit 11 (IIIs-4): Nearly level or gently sloping poorly drained clayey soils.

Unit 12 (IIw-3): Nearly level poorly drained to somewhat poorly drained soils.

Unit 13 (IIIs-5): Level poorly drained silty clay loams.

Unit 14 (IIIs-11): Level poorly drained acid clayey soils.

Unit 15 (IIIs-13): Level or nearly level poorly drained mixture of soils of the depressions.

Class IV.—Soils very severely limited for use as cropland but suitable for cultivation part of the time or for special crops.

Unit 16 (IVw-1): Level or nearly level poorly to very poorly drained soil in the depressions.

Unit 17 (IVe-1): Somewhat poorly drained to moderately well drained strongly sloping loamy soils.

Unit 18 (IVe-2): Mostly poorly drained to somewhat poorly drained strongly sloping clayey soils.

Capability units

The soils of Sunflower County have been placed in 18 capability units, each of which is discussed in the following pages. All the soils in one unit need about the same kind of management, respond to management in about the same way, and have essentially the same limitations. In each unit the characteristics and suitability of the soils for crops are discussed, and some suggestions are given for management. The crop rotations mentioned are given as examples. They are not the only rotations suited to the soils in the group.

CAPABILITY UNIT I (I-1)

Nearly level mostly moderately well drained loamy soils:

Dexter silt loam, nearly level phase.
 Dubbs silt loam, nearly level phase.
 Dubbs very fine sandy loam, nearly level phase.
 Dundee silt loam, nearly level phase.
 Dundee very fine sandy loam, nearly level phase.
 Pearson silt loam, nearly level phase.

These acid soils occur in small to fairly large areas on the higher parts of old natural levees. The surface soils are silt loam, loam, or very fine sandy loam, 5 to 9 inches thick. If left bare, they tend to crust after rains. The silt loams sometimes crust so hard that stands of crops are poor.

The subsoils range from silty clay to silt loam. They favor movement of water and air as well as growth of roots.

Soils of this unit are well suited to cotton, corn, soybeans, sorghum, small grains, millet, and sudangrass. Vetch and wild winter peas are good as winter cover crops or for growing with small grains. The soils produce good permanent pastures of bermudagrass, dallisgrass, johnsongrass, whiteclover, vetch, and wild winter peas. Lespedeza, alfalfa, red clover, and fescues are only fairly well suited.

The trees that grow well on these soils are sweetgum, soft elm, hackberry, green ash, white ash, hickory, and cherrybark, cow, Delta post, Nuttall, Shumard, southern red, water, and willow oaks.

Suitable crop rotations are (1) 6 years of row crops followed by 3 years of sod crops, and (2) 1 year of a row crop and 1 year of oats seeded to vetch.

These moderately well drained soils are easy to work. Crusting is the main problem. They absorb and hold moisture well. W-ditches are needed as outlets for excess water from the contour rows. Fall breaking is not desirable because the soils will wash badly in winter if they are disturbed. Hard, compact layers, 2 to 14 inches thick, may form under the plow layer. They can be shattered by subsoiling late in fall. The small amount of organic matter in the soils can be maintained by using sod crops and turning under winter legumes. Most nonlegume crops respond to nitrogen fertilizer, and potash and phosphate are needed occasionally. As a rule the acidity of the soils must be corrected if the best yields of alfalfa are to be obtained.

CAPABILITY UNIT 2 (I-2)

Nearly level well-drained very fine sandy loam:

Bosket very fine sandy loam, nearly level phase.

This soil occurs in fairly small areas on the highest elevations on old natural levees. The surface layer is very fine sandy loam, 6 to 9 inches thick. The normally sandy clay loam subsoil favors movement of water and air and good penetration of roots.

This soil is well suited to cotton, small grains, and early market vegetables. It is fairly good for early corn. Late corn, soybeans, sorghum, millet, and sudangrass are uncertain crops at times because the soil is droughty. Vetch and wild winter peas are fairly good cover crops for winter. This soil is well suited to bermudagrass, johnsongrass, and crimson clover. Whiteclover, vetch, and wild winter peas grow fairly well. Poorly suited are summer grasses, fescue, alfalfa, dallisgrass, and annual lespedeza. Trees that grow well are sweetgum, soft elm, hackberry, green ash, white ash, hickory, and cherrybark, cow, Delta post, Nuttall, Shumard, southern red, water, and willow oaks.

Suitable crop rotations are (1) 3 years of row crops and 3 years of sod crops, and (2) 1 year of row crops and 1 year of oats and vetch.

This soil is easy to work, but at times it forms a hard

crust after rains. Some surface drainage, as with W-ditches, is needed. Fall breaking exposes the soil to erosion by winter rains. The soil is permeable to water, but its water-holding capacity is only fair. At times hard layers, 2 to 12 inches thick, form below the plow layer. They can be shattered by subsoiling late in fall when the soil is dry. The low content of organic matter can be maintained by planting sod crops for at least 3 years of every 6. Most crops, other than legumes, need nitrogen. Occasionally phosphate, potash, and lime may be needed.

CAPABILITY UNIT 3 (IIe-1)

Gently sloping mostly moderately well drained loamy soils on old natural levees:

Dubbs silt loam, gently sloping phase.
Dubbs very fine sandy loam, gently sloping phase.
Dundee silt loam, gently sloping phase.
Dundee very fine sandy loam, gently sloping phase.
Pearson silt loam, gently sloping phase.

These slightly to moderately eroded acid soils occur in long narrow bands. The surface layers of these soils are silt loam, loam, or very fine sandy loam, 4 to 6 inches thick. They are easy to work but sometimes form hard crusts after rains. Sometimes crusts on the silt loams may cause poor stands of crops. The subsoils are silty clay to silt loam. They are permeable to water and air and allow good root growth.

Crops well suited to these soils are cotton, corn, soybeans, small grains, millet, and sudangrass. Vetch and wild winter peas, grown alone or with annuals, are good winter cover crops. Dallisgrass, johnsongrass, bermudagrass, other summer grasses, whiteclover, and winter legumes make good pasture. Annual lespedeza, fescue, alfalfa, and red clover are only fairly well suited.

Trees that grow well on this soil are sweetgum, soft elm, hackberry, green ash, white ash, hickory, and cherrybark, cow, Delta post, Nuttall, Shumard, southern red, water, and willow oaks.

These are good soils for tilled crops, but erosion may be a hazard on the steeper slopes if clean-tilled crops are grown continuously. They should be tilled on the contour, and some surface drainage is needed. Grass waterways and W-type ditches are often used for drainage. Fall plowing exposes the soil to erosion by heavy winter rains. At times hard, compact layers, 2 to 14 inches thick, form below the plow layer. They should be shattered by subsoiling late in fall when the soil is dry. Maintain the small amount of organic matter by growing sod crops and turning under winter legumes. Nitrogen should be added for crops other than legumes. Occasionally, phosphate, potash, and lime are needed.

CAPABILITY UNIT 4 (IIe-4)

Gently sloping moderately well drained and somewhat poorly drained silty clay loam:

The one soil in this unit is Dundee silty clay loam, gently sloping phase. It is in widely scattered narrow bands on old natural levees. Its surface layer, a silty clay loam 2 to 5 inches thick, is underlain by a silty clay subsoil that somewhat restricts movement of water and air and growth of roots. Much of the area has been slightly eroded, and spots have been moderately eroded.

This soil is well suited to cotton, small grains, soybeans, and other common crops. It is only fairly well suited to corn and annual lespedeza. This soil produces good

permanent pastures of perennial and summer grasses, as well as the perennial and annual legumes, except annual lespedeza. The trees that grow well on this soil are sweetgum, hackberry, green ash, white ash, hickory, and cherrybark, cow, Delta post, Nuttall, Shumard, southern red, water, and willow oaks.

Suitable crop rotations are (1) row crops for 2 or 3 years followed by 3 years of sod crops and (2) 2 years of row crops, 1 year of oats followed by soybeans, 1 year of oats and left fallow. Contour tillage can be used to control erosion on these fairly steep slopes, and some surface drainage is needed, as grass waterways and W-type ditches. Excess moisture sometimes delays cultivation of this soil. This soil is slowly permeable but it retains moisture well. The small content of organic matter can be maintained or increased by growing green-manure crops for 3 years of every 5 or 6 years. Crop residues, shredded or cut in the fall, should overwinter as a soil cover. Nitrogen fertilizer can be added for most crops, and some crops may need phosphate, potash, and lime.

CAPABILITY UNIT 5 (IIS-1)

Well-drained to somewhat excessively drained sandy loams on old natural levees:

- Beulah fine sandy loam, nearly level phase.
- Beulah fine sandy loam, gently sloping phase.
- Bosket very fine sandy loam, gently sloping phase.
- Dundee-Clack soils, nearly level phases.
- Dundee-Clack soils, gently sloping phases.

These nearly level or gently sloping, deep, acid soils occur in fairly small areas, mostly near the Sunflower River.

The surface layers of these soils are mostly very fine sandy loam or fine sandy loam, 5 to 10 inches thick. Some of the soils have more sandy surface layers. The subsoils are mostly sandy clay loam to sandy loam. A few are silty clay loam or loamy sand. The soils are very permeable to water, air, and plant roots.

Crops well suited to these soils are early market vegetables, small grains for grazing, and vetch. Cotton, early corn, and wild winter peas are fairly well suited. Normally, crops of soybeans, late corn, sudangrass, and millet are limited because these soils do not retain moisture well. The soils produce good pastures of bermudagrass, johnsongrass, and crimson clover. Dallisgrass, annual lespedeza, white clover, fescue, and red clover are not well suited. Forest trees that grow well on these soils are green ash, white ash, cottonwood, hackberry, bitter pecan, soft elm, sweetgum, and cherrybark, cow, Delta post, Nuttall, southern red, Shumard, water, white, and willow oaks.

Suitable crop rotations are (1) row crops for 2 years followed by 4 years of grass and legumes; and (2) 1 year of row crops, 1 year of oats or ryegrass seeded with vetch, and 1 year of volunteer vetch and native grasses.

These soils are easy to till, but at times hard crusts form after rains. They absorb moisture fairly rapidly, but it is not well retained. In years of average rainfall some of the soils are somewhat droughty. Fall plowing leaves the soil exposed to the heavy rains of winter. Compact layers, 2 to 12 inches thick, sometimes form below the plow layer. They can be shattered by subsoiling late in fall when the soil is dry. The low content of organic matter can be maintained by growing sod for 4 years out of every 6. Use of crop residues and turning

under of winter legumes late in spring benefit clean-tilled crops. Nitrogen leaches out fast so it should be added with care. Two small applications of nitrogen fertilizer are better than a single large one. Phosphate, potash, and lime also may be needed.

CAPABILITY UNIT 6 (IIS-2)

Nearly level somewhat poorly drained acid clayey soil that is rather difficult to work:

The only soil in this group—Tunica silty clay, nearly level phase—occurs in small areas scattered on the highest parts of the slack-water areas.

The surface layer is a silty clay, 3 to 4 inches thick. The clay to silty clay subsoil overlies coarser material at depths of 20 to 30 inches. The clayey subsoil somewhat retards water, air, and plant roots.

Crops well suited to this soil are cotton, sorghum, soybeans, small grains, rice, vetch, and wild winter peas. Corn, annual lespedeza, millet, and sudangrass are only fairly well suited. This soil produces good pasture of fescue, johnsongrass, dallisgrass, alfalfa, white clover, red clover, and winter legumes. Summer grasses and annual lespedeza are fairly well suited. Forest trees that grow well on this soil are sweetgum, hackberry, soft elm, green ash, bitter pecan, and Nuttall, water, and willow oaks.

Suitable crop rotations are (1) 1st and 2nd years, cotton or other row crop, and 3rd, 4th, 5th, and 6th years, sod crops; (2) 1st year, soybeans planted in spring and followed by oats and red clover in fall, 2nd year, oats harvested and land left fallow rest of year, and 3rd and 4th years, cotton or other row crops; (3) 1st year, cotton or other row crops, and 2nd and 3rd years, vetch or wild winter peas for seed.

The soil is very difficult to till. It is hard when dry and very sticky when wet. In dry seasons large cracks form that damage the roots of corn and similar row crops. Internal drainage is very slow when the soil is wet; but the soil retains water well. V-type or W-type ditches are used to remove surface water. The fairly low content of organic matter can be maintained or increased by growing sod crops for 4 years of every 6. It is desirable to deep break the soil early enough to allow the seedbed to settle before planting. Nitrogen fertilizer is normally the only fertilizer needed. The soil can be tested to see if it needs phosphate or lime.

CAPABILITY UNIT 7 (IIS-3)

Somewhat poorly and poorly drained loamy soils on old natural levees:

- Brittain silt loam, nearly level phase.
- Forestdale silt loam, nearly level phase.
- Forestdale silt loam, gently sloping phase.
- Forestdale very fine sandy loam, nearly level phase.
- Forestdale very fine sandy loam, gently sloping phase.

These are acid, nearly level to gently sloping soils. Their surface soils are silt loam to very fine sandy loam, 4 to 7 inches thick. They are easy to work but, if left bare, tend to form crusts after rains. The silt loam soils occasionally form crusts so hard that stands of crops are poor.

The subsoils range from silty clay to silt loam. They restrict movement of water and air and the growth of roots.

Crops suited to these soils are soybeans, sorghum, small grains, vetch, and wild winter peas. Cotton, corn, rice, sudangrass, and millet are fairly well suited.

Forest trees suitable for these soils are sweetgum, soft elm, hackberry, green ash, bitter pecan, and Nuttall, water, and willow oaks.

Suitable crop rotations for these soils are (1) 2 years of row crops followed by 3 years of sod crops; and (2) 2 years of row crops, 2 years of soybeans, with a mixture of oats and winter legumes seeded in the last crop of soybeans, and 1 year of oats and winter legumes, during which time the land is fallow after harvesting of the oats.

Soils of this unit wash easily. They may pack, crust, puddle, and erode if left bare. Rows that empty into W- or V-type ditches will remove surface water. Internal drainage is slow, but the soils retain a good amount of moisture for plants.

Fall breaking is not desirable because it exposes the soil to erosion during winter. In contrast, subsoiling late in fall is desirable where plowpans 2 to 14 inches thick have formed below the plow layer. Subsoiling shatters the plowpan most effectively when the soils are dry, as they are late in fall.

The small amount of organic matter in these soils can be maintained or increased by growing sod crops and winter legumes for 3 years out of every 5. The supply of nitrogen is almost always low, and some of the soils may need phosphate, potash, or lime.

CAPABILITY UNIT 8 (II-4)

Somewhat poorly and poorly drained silty clay loams:

Alligator silty clay loam, nearly level phase.
Forestdale silty clay loam, nearly level phase.
Forestdale silty clay loam, gently sloping phase.
Sharkey silty clay loam, nearly level phase.

These acid, nearly level or gently sloping soils occur in slack-water areas on the low, old natural levees. The surface soils are silty clay loam, 3 to 5 inches thick. The subsoils are clay and silty clay that greatly restrict internal movement of water and air, and the growth of roots.

The crops suited to these soils are soybeans, annual lespedeza, rice, small grains, vetch, wild winter peas, and sorghum. Cotton, sudangrass, and millet are fairly well suited. Normally, corn and alfalfa are not suitable.

Bermudagrass, johnsongrass, and winter legumes are well suited, but fescue, dallisgrass, white clover, red clover, and summer grasses are only fairly well suited.

Trees that grow well on these soils are sweetgum, soft elm, hackberry, green ash, and Nuttall, water, and willow oaks.

Suitable crop rotations are (1) 2 years of row crops followed by 3 years of sod crops; (2) 2 years of soybeans, each soybean crop followed by oats and the land left fallow after oats are harvested the second year, and 2 years of cotton; and (3) 2 years of winter legumes for seed and 1 year of cotton.

These soils are somewhat difficult to work. Rains may delay cultivation. Rows that empty into W- or V-type ditches will remove surface water and prevent ponding. Internal drainage is slow, and the amount of moisture held for crop use is fairly low. Rather large cracks form during dry weather. At times, compact layers, 2 to 12 inches thick, form just below the plow layer. These should be shattered by subsoiling late in fall when the soil is dry.

The low supply of organic matter may be increased and maintained by growing sod crops 3 years out of every 5.

The supply of nitrogen is normally low. Phosphate, potash, and lime may be needed.

CAPABILITY UNIT 9 (II-6)

Moderately well drained to somewhat poorly drained silty clay loam:

The one member of this capability unit—Dundee silty clay loam, nearly level phase—is a nearly level, acid soil that occurs in scattered small areas on the old natural levees of medium height.

The surface soil is a silty clay loam, 3 to 5 inches thick. The subsoil is a silty clay that somewhat retards water, air, and plant roots. This soil is well suited to all the local crops except corn and annual lespedeza, to which it is only fairly well suited. Locally grown perennial and summer grasses are well suited, and so are all the perennial and annual legumes except annual lespedeza. Suitable trees are sweetgum, soft elm, hackberry, hickory, green ash, white ash, and cherrybark, cow, Delta post, southern red, Shumard, water, white, and willow oaks.

Suitable crop rotations are (1) 2 years of sod crops and 4 years of row crops; and (2) 2 years of small grains and 3 years of row crops.

This soil is somewhat difficult to work. Internal drainage is slow, but the water-holding capacity is good. Surface drainage may be needed. Excess water can be drained away by carefully laid out rows and W-type ditches. The low amount of organic matter can be maintained or increased by growing sod crops 2 or 3 years out of 6. The soil almost always needs nitrogen, and in some fields it may lack phosphorus, potassium, and lime.

CAPABILITY UNIT 10 (II-3)

Level or nearly level somewhat poorly drained loamy soils in shallow depressed areas:

In this capability unit there are several loamy soils of the Souva series that were mapped together as Souva soils. The surface soils are silty clay loam and silt loam, 4 to 7 inches thick. The subsoils are normally silty clay loam that overlies finer material. The subsoils somewhat retard the penetration of water, air, and plant roots.

Crops well suited are cotton, corn, soybeans, millet, sudangrass, and sorghum. Vetch and wild winter peas are suitable as winter cover crops if the surface water can be removed quickly. Grasses suitable for pasture are bermudagrass, dallisgrass, johnsongrass, whiteclover, vetch, and wild winter peas. With adequate surface drainage, fescue, annual lespedeza, alfalfa, and red clover are fairly well suited. Trees suited to these soils are Nuttall, water, and willow oaks, sweetgum, hackberry, soft elm, green ash, and bitter pecan.

Suitable crop rotations are much like those for the adjacent soils. Two examples are (1) 3 years of sod crops followed by 6 years of row crops; and (2) 1 year of soybeans and 1 year of cotton or corn.

After heavy rains, water from higher surrounding soils often floods these narrow depressed areas. This water can be removed by V- or W-type ditches. Internal drainage is fairly slow, but the soils hold a good supply of moisture for plants. The supply of organic matter is fairly low, but it is higher than in adjacent soils. Nitrogen normally is the only fertilizer needed.

CAPABILITY UNIT 11 (III-4)

Nearly level or gently sloping poorly drained clayey soils:

Alligator clay, nearly level phase.
 Alligator clay, gently sloping phase.
 Alligator silty clay, nearly level phase.
 Alligator silty clay, gently sloping phase.
 Forestdale silty clay, nearly level phase.
 Forestdale silty clay, gently sloping phase.
 Iberia clay.
 Sharkey clay, nearly level phase.
 Sharkey clay, gently sloping phase.
 Sharkey-Clack soils, nearly level phases.
 Sharkey-Clack soils, gently sloping phases.

These acid soils occur in slack-water areas. The nearly level soils have had little or no erosion. The gently sloping soils may be slightly or moderately eroded. The surface soils are mostly clay and silty clay, 2 to 5 inches thick. The subsoils are mainly clay that retards movement of water and air, and growth of plant roots.

Crops well suited to these soils are small grains, rice (fig. 3), soybeans, vetch, and wild winter peas. Cotton,



Figure 3.—Rice, a comparatively new crop in the county and excellent for Alligator clays, is irrigated from nearby lakes, streams, and wells.

sudangrass, millet, and annual lespedeza are, at best, only fairly well suited. Corn is an uncertain crop. Bermudagrass, johnsongrass, dallisgrass, fescue, and white and red clovers are well suited.

Forest trees suited to these soils are sweetgum, soft elm, hackberry, green ash, and Nuttall, water, and willow oaks.

Among the crop rotations suitable are (1) 4 years of sod crops and 2 years of row crops; (2) 2 years of small grains or soybeans and 1 year of cotton; (3) 2 or 3 years of rice and 3 years of pasture, a small grain and vetch, or soybeans; and (4) 2 years of winter legumes for seed and 1 year of cotton.

These soils are difficult to manage. It is difficult to get good stands of crops because the soils swell and seal over when wet and crack severely when dry. The soils must be cultivated within very narrow moisture limits. Rows must be laid out so as to give the greatest amount of drainage with the least erosion. This can be done by digging many V- and W-type ditches. Fall breaking is desirable because spring breaking may leave the soils extremely cloddy all through the growing season. Internal drainage is very slow when the soils are wet. Except for

Iberia clay the soils have a low supply of organic matter, but it can be maintained by growing sod crops 4 years out of every 6. The supply of nitrogen is almost always low. Lime may be needed for some legumes. The soils in some places are low in phosphorus.

CAPABILITY UNIT 12 (IIIw-3)

Nearly level poorly drained to somewhat poorly drained soils:

Forestdale silt loam, level phase.
 Forestdale very fine sandy loam, level phase.

Fairly small areas of these loamy soils are scattered on the low natural levees. The surface soils are silt loam and very fine sandy loam, 5 to 7 inches thick.

The subsoils normally are thick silty clay underlain by sandier material. They retard penetration of water, air, and plant roots.

The crops suited are soybeans, sorghum, small grains, rice, vetch, and wild winter peas. Cotton, corn, sudangrass, and millet are, at best, only fairly well suited.

The suitable pasture crops are bermudagrass, johnsongrass, vetch, and wild winter peas. Fescue, dallisgrass, white clover, red clover, annual lespedeza, and summer grasses are fairly well suited.

Forest trees suited to these soils are hackberry, soft elm, green ash, bitter pecan, willow and overcup oaks, water locust, and persimmon.

Suitable rotations are (1) 3 years of sod crops and 2 years of corn or other row crops; (2) 2 years of soybeans followed each year by oats and winter legumes, and the third year, the oat-legume crop harvested and followed by fallow.

These soils are easy to till but, if left bare, they will crust, pack, and puddle after rains. Sometimes the hard crusts cause poor stands of crops. Internal drainage is slow, but the soils hold a good amount of water for plants. V- and W-ditches will remove surface water and prevent ponding. The low supply of organic matter can be increased and maintained by growing sod crops for at least 3 years out of every 5.

Compacted layers, 2 to 14 inches thick, form just below the plow layer in some places. These layers should be shattered by subsoiling in the dry months late in fall.

Nitrogen is almost always needed for nonlegume crops. The soils can be tested to determine whether they need phosphate, potash, and lime.

CAPABILITY UNIT 13 (IIIw-5)

Level poorly drained silty clay loams:

Alligator silty clay loam, level phase.
 Forestdale silty clay loam, level phase.
 Sharkey silty clay loam, level phase.

The small areas of these acid soils are scattered mainly in the level slack-water areas. The surface layers are silty clay loam, 4 to 5 inches thick. The subsoils are clay and silty clay that somewhat slow the movement of water and the growth of roots.

The crops suitable are soybeans, annual lespedeza, rice, small grains, vetch, wild winter peas, and sorghum. Sudangrass and millet are fairly well suited. Corn, cotton, and alfalfa are uncertain crops.

Well-suited pasture crops are bermudagrass, johnsongrass, fescue, and the winter legumes. Dallisgrass, white and red clovers, and summer grasses are only fairly well suited.

Forest trees suited to these soils are sweetgum, soft elm, hackberry, green ash, white ash, hickory, and cow, Delta post, cherrybark, Nuttall, southern red, Shumard, water, white, and willow oaks.

Suitable crop rotations are (1) 3 years of sod crops and 2 years of row crops; (2) 2 years of soybeans, each followed by oats, and the third year, the oats harvested and followed by fallow; and (3) 2 years of winter legumes for seed and 1 year of cotton.

Internal drainage is slow, and the soils retain a fairly low amount of water for plants. During dry weather large cracks form. Surface drainage is slow, and runoff from adjacent higher areas frequently floods these soils. Accumulation of surface water can seriously delay planting and cultivating. Rows that empty into V- or W-type ditches are needed to prevent ponding.

The low supply of organic matter can be increased and maintained by growing sod crops 2 years out of every 4. The supply of nitrogen is almost always low. The need for phosphate, potash, and lime can be determined by making soil tests.

CAPABILITY UNIT 14 (IIIw-11)

Level poorly drained acid clayey soils:

Alligator clay, level phase.
Alligator silty clay, level phase.
Forestdale silty clay, level phase.
Sharkey clay, level phase.

These soils occur in slack-water areas. The surface layers are clay and silty clay, 2 to 4 inches thick. The subsoils are mostly clay that retards movement of water and air and root growth of many plants. The crops suited to these soils are soybeans, rice, and sorghum. Sudangrass and millet are only fairly well suited. Small grains, vetch, wild winter peas, and cotton are uncertain crops unless adequate surface drainage is provided. Bermudagrass, johnsongrass, fescue, and whiteclover are well suited. Sudangrass, red clover, and annual lespedeza are fairly well suited.

Forest trees suited to these soils are sweetgum, soft elm, hackberry, green ash, bitter pecan, and Nuttall, water, and willow oaks.

Suitable crop rotations are (1) 4 years of sod crops and 2 years of row crops; (2) 2 or 3 years of rice and 3 years of pasture, small grains, or soybeans; (3) 2 years of summer legumes and 1 year of nonlegume row crops; and (4) 2 years of winter legumes for seed and 1 year of nonlegume row crops.

These poorly drained to very poorly drained soils are difficult to manage. The thin surface layers of very high clay content are very plastic and sticky when wet, so they seal over and puddle. This causes poor aeration. When dry the soils crack and injure the roots of many plants. Internal drainage is very slow. Surface drainage is slow, and at times the soils are flooded by runoff from adjacent higher areas. The surface water can be removed by draining through carefully laid out rows into V- or W-type ditches.

The low supply of organic matter can be maintained or increased by growing sod crops for 4 years out of every 6. The supply of nitrogen in the soil is normally low. Lime may be needed for some legumes. Normally there is enough phosphorus and potassium.

CAPABILITY UNIT 15 (IIIw-13)

Level or nearly level poorly drained mixture of soils of the depressions:

Dowling soils, overwash phases.
Waverly silt loam, local alluvium phase.

These soils occur in long, narrow, depressed areas. The clay to silt loam surface layers vary in texture and thickness, according to the amount of recent alluvium deposited. The subsoils are mostly clay that may contain lenses of coarser material. They retard the movement of water, air, and many plant roots.

Rice and sorghum are well suited to these soils. Soybeans, corn, wheat, vetch, and wild winter peas are fairly well suited. Cotton, oats, and barley are uncertain crops because of the excess moisture.

Whiteclover, millet, and such pasture crops as fescue, bermudagrass, dallisgrass, and sudangrass are fairly well suited. Johnsongrass and red clover generally are not suited. Forest trees suited to these soils are sweetgum, soft elm, hackberry, hickory, green ash, white ash, bitter pecan, and cherrybark, cow, Delta post, Nuttall, Shumard, water, southern red, and willow oaks.

Suitable crop rotations are (1) 4 years of sod crops and 2 years of row crops; and (2) hay meadow.

These soils are difficult to manage. They may be flooded frequently because of the very slow surface drainage and lack of drainage outlets. They are becoming poorly aerated because of poor internal drainage. Fertility is fairly high. The content of organic matter, though fairly low, is higher than in the surrounding soils. Nevertheless, the fine texture, poor drainage, and low position of these soils prevent plants from using fertilizers at top efficiency. Extensive surface drainage is needed to grow crops.

CAPABILITY UNIT 16 (IVw-1)

Level or nearly level poorly to very poorly drained soil in the depressions:

The soil in this capability unit—Dowling clay—occurs in long, narrow, depressed areas. The clay surface layer varies in thickness, depending on the amount of recent alluvium deposited from runoff waters. The clay subsoil retards the movement of water, air, and plant roots.

Rice is well suited to this soil. Sorghum, soybeans, millet, and sudangrass are fairly well suited. Cotton, corn, oats, and similar crops are uncertain because of the excess moisture. Fescue, bermudagrass, and dallisgrass are fairly well suited. Johnsongrass and red clover are not suited.

Forest trees suited to the soil are bitter pecan, cottonwood, cypress, green ash, hackberry, persimmon, soft elm, swamp blackgum, tupelo-gum, waterlocust, willow, and overcup and willow oaks.

Surface runoff is very slow, and the soil is flooded part of the year. Water collects from higher surrounding soils and remains because there are no outlets. Excess water often delays planting and cultivating. During dry periods cracks form that damage plant roots.

This soil is fertile, but its fine texture, poor drainage, and low position prevent plants from taking full advantage of the natural fertility or of fertilizers applied. Extensive surface drainage is needed to grow row crops.

CAPABILITY UNIT 17 (Ive-1)

Somewhat poorly drained to moderately well drained strongly sloping loamy soils:

Dundee silt loam, sloping phase.
Dundee very fine sandy loam, sloping phase.
Forestdale silt loam, sloping phase.

These slightly to moderately eroded, acid soils are widely scattered in narrow bands on old natural levees. The silt loam to very fine sandy loam surface layers are 3 to 6 inches thick. When left bare, they form crusts and erode readily. The silty clay to silty clay loam subsoils are underlain by sandier material.

Small grains are fairly well suited to these soils. Cotton or soybeans can be grown occasionally, but these soils are better left in permanent pasture. Bermudagrass, johnsongrass, dallisgrass, and whiteclover are suitable pasture plants.

Suitable forest trees are cherrybark, cow, Delta post, Shumard, Nuttall, southern red, water, white, and willow oaks, sweetgum, soft elm, hackberry, green ash, white ash, hickory, and cottonwood.

Where these soils are cleared, a suitable crop rotation is 4 or 5 years of sod crops followed by 1 year of soybeans, cotton, or a similar row crop.

The internal drainage and water-holding capacity of these soils are fair. Rows on the contour that empty into grassed W-ditches will remove excess surface water. The low content of organic matter is difficult to maintain unless these soils are kept in permanent pasture. Nitrogen fertilizer is always needed for nonlegume crops. The soils can be tested to determine the need for phosphate, potash, and lime.

CAPABILITY UNIT 18 (Ive-2)

Mostly poorly drained to somewhat poorly drained strongly sloping clayey soils:

Alligator clay, sloping phase.
Dundee silty clay loam, sloping phase.
Forestdale silty clay loam, sloping phase.
Sharkey clay, sloping phase.

These slightly to moderately eroded, acid soils occur in narrow bands, widely scattered along present or former stream channels. The clay to silty clay loam surface layers are 2 to 4 inches thick. The subsoils are clay and silty clay that retard water, air, and plant roots.

Crops fairly well suited to these soils are small grains, vetch, and wild winter peas. Suitable pasture crops are bermudagrass, johnsongrass, dallisgrass, fescue, white clover, and red clover.

Forest trees suited to these soils are water, Nuttall, willow, Delta post, southern red, and white oaks, sweetgum, soft elm, hackberry, green ash, and bitter pecan.

It is desirable to keep these soils in permanent pasture. Where cleared, a suitable crop rotation is 5 years of sod crops followed by 1 year of a row crop.

These soils are difficult to manage for clean-tilled crops. When the soils are wet, they are very poorly aerated and internal drainage is very slow. When dry, they shrink and crack severely. Rows on the contour that empty into grassed W-ditches can be used to remove excess surface water.

The low content of organic matter is difficult to maintain unless the soils are left in pasture. The nitrogen content is

always low. The soils can be tested to determine the need for phosphate, potash, and lime.

Estimated Yields

Estimated acre yields are given in table 3 for the principal crops of Sunflower County. The yields are listed by capability units at two levels of management. The yields in columns A are those to be expected under common management. The yields in columns B are to be expected under improved management.

The yields in columns A are obtained by farmers who use a few, rather than all, of the management practices proved to be the best for producing good yields of a specified crop. As an example, the best management for obtaining a high yield of cotton on a particular soil might be—

1. Improve drainage.
2. Subsoil when the soil is dry to shatter the plowpan.
3. Prepare a good seedbed.
4. Select a high-yielding variety.
5. Apply large amounts of nitrogen.
6. Control insects.
7. Maintain or improve the supply of organic matter by growing sod crops for 3 years out of every 6.
8. Irrigate as needed.

A farmer might follow all of these practices except insect control. By ignoring this one part of management, his yields would drop to those predicted in columns A. If he used all the practices listed, he would obtain yields that are comparable to the ones given in columns B.

Control of Water on the Land

This section discusses irrigation; control of water on the land in terms of drainage and control of runoff; and selection of sites for roads and buildings. The characteristics of the soils and climate are stressed, because detailed plans for irrigating, draining, and controlling erosion are beyond the scope of a soil survey report. Advice on these subjects can be obtained through the county agent or the local representative of the Soil Conservation Service.

The soils of Sunflower County are drained mainly by V-ditches or W-ditches. V-ditches are either narrow with vertical sides or V-shaped with flat side slopes. V-ditches should be at least 1 foot deep and 12 feet wide. They should have no more than 1 foot rise in 4 feet of slope. The side slopes should be gradual enough to permit mowing and easy crossing with farm machinery.

W-ditches are used on gently sloping land where it is advantageous to dispose of the excavated material between two parallel ditches, one on each side of the spoilbank. This allows the water to enter the ditches freely because no excavated material is piled up alongside the ditches to keep the water out. One ditch takes the water from one side of the spoilbank, and the other, the water on the other side.

The channels of W-ditches should be 30 feet apart and at least 6 inches below ground level with the excavated soil placed between the channels. Care is needed in preparing the ditches so that no humps will be left in the channel to interfere with the flow of water. The side slopes should be gradual enough to permit mowing and easy crossing with farm machinery.

TABLE 3.—*Estimated average acre yields of principal crops under two levels of management (for each land-capability unit)*
 [Yields in columns A are those obtained under common management; yields in B columns are those obtained under good management; where no yield is indicated, soil is not suited to the crop]

Capability units and soils	Cotton (lint)		Corn		Oats		Soybeans ¹		Rice ²		Lespe- deza hay ¹	Permanent pasture	
	A	B	A	B	A	B	A	B	A	B	A	A	B
Unit 1 (I-1)—Nearly level mostly moderately well drained loamy soils:													
Dexter silt loam, nearly level phase.....	Lb. 600	Lb. 800	Bu. 40	Bu. 85	Bu. 35	Bu. 55	Bu. 15	Bu. 25	Bu. -----	Bu. -----	Tons 1. 25	Acres per animal unit ³ 4. 2	Acres per animal unit ³ 2. 2
Dubbs silt loam, nearly level phase.....	600	800	40	85	35	55	15	25	-----	-----	1. 25	4. 2	2. 2
Dubbs very fine sandy loam, nearly level phase.....	600	800	40	85	35	55	15	25	-----	-----	1. 00	4. 2	2. 2
Dundee silt loam, nearly level phase.....	600	750	40	85	35	55	15	25	-----	-----	1. 25	4. 2	2. 2
Dundee very fine sandy loam, nearly level phase.....	600	750	40	85	35	55	15	25	-----	-----	1. 00	4. 2	2. 2
Pearson silt loam, nearly level phase.....	550	750	40	85	35	55	15	25	-----	-----	1. 25	4. 2	2. 2
Unit 2 (I-2)—Nearly level well-drained very fine sandy loam:													
Bosket very fine sandy loam, nearly level phase.....	600	750	40	75	30	50	10	15	-----	-----	. 75	5. 0	2. 4
Unit 3 (IIe-1)—Gently sloping mostly moderately well drained loamy soils on old natural levees:													
Dubbs silt loam, gently sloping phase.....	525	700	35	60	33	55	10	15	-----	-----	1. 00	4. 2	2. 4
Dubbs very fine sandy loam, gently sloping phase.....	525	700	35	60	33	55	10	15	-----	-----	1. 00	4. 2	2. 4
Dundee silt loam, gently sloping phase.....	525	650	35	60	35	55	10	15	-----	-----	1. 00	4. 2	2. 4
Dundee very fine sandy loam, gently sloping phase.....	525	650	35	60	35	55	10	15	-----	-----	1. 00	4. 2	2. 4
Pearson silt loam, gently sloping phase.....	500	600	35	60	30	50	10	15	-----	-----	1. 00	4. 2	2. 4
Unit 4 (IIe-4)—Gently sloping moderately well drained and somewhat poorly drained silty clay loam:													
Dundee silty clay loam, gently sloping phase.....	400	500	25	45	35	55	15	20	-----	-----	. 75	5. 5	3. 5
Unit 5 (IIs-1)—Well-drained to somewhat excessively drained sandy loams on old natural levees:													
Beulah fine sandy loam, nearly level phase.....	375	500	30	60	30	50	10	15	-----	-----	. 50	5. 0	2. 5
Beulah fine sandy loam, gently sloping phase.....	325	450	20	40	30	50	10	15	-----	-----	. 50	5. 0	2. 5
Bosket very fine sandy loam, gently sloping phase.....	450	550	30	60	30	50	10	15	-----	-----	. 50	5. 0	2. 5
Dundee-Clack soils, nearly level phases.....	525	650	30	60	35	55	10	20	-----	-----	. 75	4. 0	2. 5
Dundee-Clack soils, gently sloping phases.....	475	600	20	55	35	55	10	15	-----	-----	. 50	4. 5	3. 5
Unit 6 (IIs-2)—Nearly level somewhat poorly drained acid clayey soil that is rather difficult to work:													
Tunica silty clay, nearly level phase.....	450	625	30	45	30	55	15	30	40	70	1. 25	4. 5	3. 0
Unit 7 (IIs-3)—Somewhat poorly and poorly drained loamy soils on old natural levees:													
Brittain silt loam, nearly level phase.....	375	500	30	55	30	50	15	25	40	65	1. 25	4. 2	2. 3
Forestdale silt loam, nearly level phase.....	375	500	35	55	30	50	15	25	40	70	1. 25	4. 2	2. 3
Forestdale silt loam, gently sloping phase.....	350	450	25	50	25	50	12	25	40	50	1. 00	4. 5	2. 5
Forestdale very fine sandy loam, nearly level phase.....	450	650	35	65	30	55	15	25	40	60	1. 25	4. 2	2. 3
Forestdale very fine sandy loam, gently sloping phase.....	400	500	30	50	25	50	12	25	40	50	1. 00	4. 5	2. 5
Unit 8 (IIs-4)—Somewhat poorly and poorly drained silty clay loams:													
Alligator silty clay loam, nearly level phase.....	350	425	25	50	25	50	15	30	40	70	1. 25	5. 5	2. 8
Forestdale silty clay loam, nearly level phase.....	350	475	25	50	30	50	15	30	40	70	1. 25	5. 5	2. 8
Forestdale silty clay loam, gently sloping phase.....	325	400	25	40	30	50	15	25	40	70	1. 00	5. 5	2. 8
Sharkey silty clay loam, nearly level phase.....	375	500	35	55	30	50	15	30	40	70	1. 25	5. 5	2. 8
Unit 9 (IIs-6)—Moderately well drained to somewhat poorly drained silty clay loam:													
Dundee silty clay loam, nearly level phase.....	475	625	30	50	35	55	15	25	35	50	1. 25	4. 5	2. 5
Unit 10 (IIw-3)—Level or nearly level somewhat poorly drained loamy soils in shallow depressed areas:													
Souva soils.....	350	500	45	80	-----	-----	15	25	-----	-----	1. 25	5. 0	2. 4

See footnotes at end of table.

TABLE 3.—*Estimated average acre yields of principal crops under two levels of management (for each land-capability unit)—Continued*

[Yields in columns A are those obtained under common management; yields in B columns are those obtained under good management; where no yield is indicated, soil is not suited to the crop]

Capability units and soils	Cotton (lint)		Corn		Oats		Soybeans ¹		Rice ²		Lespe- deza hay ¹	Permanent pasture	
	A	B	A	B	A	B	A	B	A	B	A	A	B
Unit 11 ³ (III-4)—Nearly level or gently sloping poorly drained clayey soils:	<i>Lb.</i>	<i>Lb.</i>	<i>Bu.</i>	<i>Bu.</i>	<i>Bu.</i>	<i>Bu.</i>	<i>Bu.</i>	<i>Bu.</i>	<i>Bu.</i>	<i>Bu.</i>	<i>Tons</i>	<i>Acres per animal unit³</i>	<i>Acres per animal unit³</i>
Alligator clay, nearly level phase	250	400	20	45	30	50	12	30	40	70	1.25	6.0	3.0
Alligator clay, gently sloping phase	250	400	20	45	30	50	12	30	40	70	1.00	5.5	3.5
Alligator silty clay, nearly level phase	250	400	20	45	30	50	12	30	40	70	1.25	6.0	3.0
Alligator silty clay, gently sloping phase	250	400	20	45	30	50	12	25	40	70	1.00	5.5	3.5
Forestdale silty clay, nearly level phase	250	400	20	45	30	50	12	30	40	70	1.25	6.0	3.0
Forestdale silty clay, gently sloping phase	250	400	20	45	30	50	12	30	40	70	1.00	5.5	3.5
Iberia clay	325	500	25	60	30	50	15	35	40	70	1.25	5.5	3.5
Sharkey clay, nearly level phase	300	400	25	50	30	50	15	30	40	70	1.25	6.0	3.0
Sharkey clay, gently sloping phase	300	400	25	50	30	50	15	30	40	70	1.00	6.0	3.0
Sharkey-Clack soils, nearly level phases	275	400	20	50	30	50	10	25	40	50	1.25	6.0	3.0
Sharkey-Clack soils, gently sloping phases	275	400	20	45	30	50	10	20	40	50	1.00	6.0	3.0
Unit 12 (IIIw-3)—Nearly level poorly drained to somewhat poorly drained soils:													
Forestdale silt loam, level phase	325	450	25	50			15	25	40	60	1.25	5.0	3.0
Forestdale very fine sandy loam, level phase	325	450	25	50	20	30	15	25	40	60	1.25	5.0	3.0
Unit 13 (IIIw-5)—Level poorly drained silty clay loams:													
Alligator silty clay loam, level phase	250	300	15	25			15	30	40	70	1.25	5.5	3.5
Forestdale silty clay loam, level phase	250	325	20	35			15	30	40	70	1.25	5.5	3.5
Sharkey silty clay loam, level phase	250	325	15	40			15	30	40	70	1.25	5.5	3.5
Unit 14 (IIIw-11)—Level poorly drained acid clayey soils:													
Alligator clay, level phase	200	300	15	25			12	30	40	70	1.25	6.0	4.0
Alligator silty clay, level phase	200	300	15	25			12	30	40	70	1.25	6.0	4.0
Forestdale silty clay, level phase	200	300	15	25			12	30	40	70	1.25	6.0	4.0
Sharkey clay, level phase	200	300	20	35			15	30	40	70	1.25	6.0	4.0
Unit 15 (IIIw-13)—Level or nearly level poorly drained mixture of soils of the depressions:													
Dowling soils, overwash phases	200	300	15	35			15	30	35	70	.75	5.0	2.8
Waverly silt loam, local alluvium phase	200	275	15	30			10	20	35	70	.50	6.0	4.0
Unit 16 (IVw-1)—Level or nearly level poorly to very poorly drained soil in the depressions:													
Dowling clay							15	30	35	70	.50	8.0	4.0
Unit 17 (IVe-1)—Somewhat poorly drained to moderately well drained strongly sloping loamy soils:													
Dundee silt loam, sloping phase					20	35	5	15			.50	6.0	4.0
Dundee very fine sandy loam, sloping phase					20	35	5	15			.50	6.0	4.0
Forestdale silt loam, sloping phase					15	30	5	15			.50	6.0	4.0
Unit 18 (IVe-2)—Mostly poorly drained to somewhat poorly drained strongly sloping clayey soils:													
Alligator clay, sloping phase					15	30	5	15			.50	6.0	4.0
Dundee silty clay loam, sloping phase					15	35	5	15			.50	6.0	4.0
Forestdale silty clay loam, sloping phase					15	30	5	15			.50	6.0	4.0
Sharkey clay, sloping phase					15	30	5	15			.50	6.0	4.0

¹ Yields vary with rainfall; highest yields are obtained during wet growing seasons.² After 2 succeeding years of growing rice, yields often decline sharply.³ An animal unit is equivalent to 1 cow, steer, or horse; 5 hogs; 7 sheep; or 7 goats.

Irrigation

Irrigation farming is a specialized type of farming that requires careful planning based on reliable information. Among other things, the farmer needs to know (1) how different kinds of soils take in, hold, and give up moisture; (2) how different kinds of plants use moisture; (3) how to

apply water so as to best meet the needs of the soils and the plants growing on them; (4) cost of supplying the water; (5) the probable increase in yield if the water is applied; and (6) the price to be expected from the crops grown.

Farmers who plan to irrigate, or who have already installed an irrigation system, need detailed information

that cannot be supplied in a soil survey report. They can obtain this from the local representative of the Soil Conservation Service or the county agent.

Nevertheless, it seems worth while to point out in this report the pattern of rainfall, the results of some experiments on irrigation, and ways of estimating the amount of moisture in soils of various textures.

Pattern of rainfall

In this county the total annual rainfall normally exceeds the amount needed for best crop production, but most of it falls in winter when crops need the least moisture. Many days, or even weeks, during summer the crops need far more moisture than the rainfall provides (fig. 4).

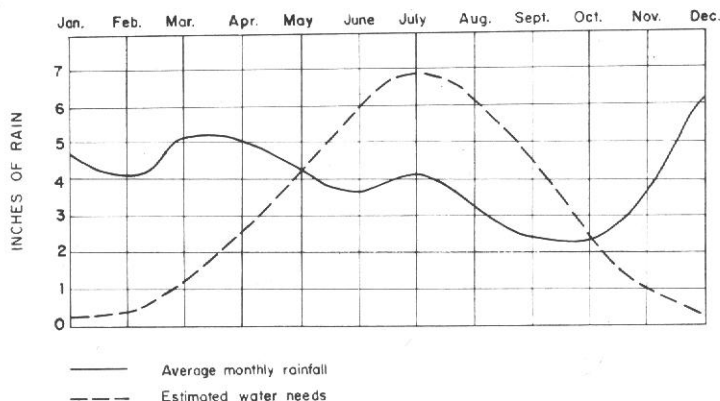


Figure 4.—Average annual rainfall and estimated water needed yearly for best plant growth at Moorhead, Miss.

Frequently, summer droughts are severe enough to reduce yields of pasture and row crops. In most years, perennial pasture is severely affected by high temperatures and shortage of moisture from midsummer to late in summer.

Records of crop needs for moisture are not available for Sunflower County, but the shortage of summer rainfall can be estimated from records at Stoneville, Miss., which has similar rainfall and equivalent need of moisture for plant growth. At Stoneville, rainfall was less than the crops needed for 21 out of 22 years in August for the period 1930–51. In this period, the September rainfall was short of crop needs in 19 years, October rainfall in 9, and November rainfall in 2 years. For the same period, the May rainfall was short of crop needs in 2 years, the June rainfall in 11, and the July rainfall in 17 years.

Irrigation experiments

Irrigation experiments made in the period 1952–54 at the Delta branch of the Mississippi Agricultural Experiment Station in Washington County, west of Sunflower County, disclosed the following facts:

1. On sandy loam soils, during the 1952–54 period, irrigation increased the yield of seed cotton about 750 pounds an acre; corn, 26 bushels an acre; and soybeans, 8 bushels an acre.
2. On clay soils, irrigation increased yields of corn 30 bushels an acre; soybeans, 10 bushels an acre; and alfalfa, 1.5 tons an acre. In 1954, cotton yields did not increase under irrigation.
3. In 1954, each acre of irrigated pasture of dallisgrass, johnsongrass, and coastal bermudagrass added more than 300 pounds of weight to beef cattle in the period July 26 to November.
4. Sudangrass and millet responded well to irrigation.

5. If winter crops such as fescue, oats, wheat, and ryegrass are irrigated once early in September, seeds germinate better and early fall growth increases.
6. Irrigation of cotton on hardpan soil is of little benefit unless the hardpan is broken.
7. If cotton and corn have wilted severely, irrigation only slightly increases yields. Water must be applied before wilting if it is to be of much value.
8. Insects are more difficult to control if cotton is irrigated.
9. Irrigation makes control of grasses and weeds more difficult.

In judging the benefits and disadvantages of irrigation just listed, it should be recalled that yields of most non-irrigated crops were severely reduced by dry weather in 1952 and 1954, and that yields of many nonirrigated crops were reduced in 1953. Because the experiments were made in dry years, the increases in yield resulting from irrigation are probably larger than they would be in years of average or better rainfall. However, as shown in figure 3, there normally is a shortage of rainfall during the growing season, and as previously mentioned, August rainfall has been less than the need for moisture in 21 years out of 22, at Stoneville, Miss.

Some crops in Sunflower County are now being irrigated to correct seasonal shortage of water, high temperature, and the low water-holding capacity of some soils (fig. 5).

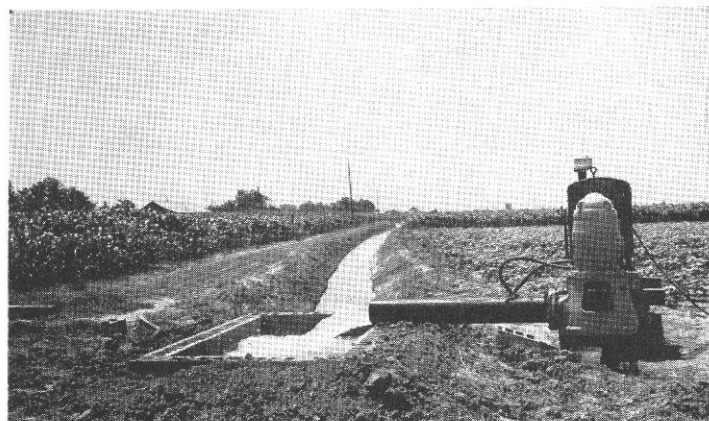


Figure 5.—Irrigation system for cotton and corn on Dubbs very fine sandy loams.

Soil moisture supply²

Described in table 4 are the appearance and behavior of soils of several textures when they contain various percentages of moisture ranging from dry to above field capacity. This information will be useful to those who have installed irrigation systems or who are considering the possibility of irrigating their land.

Soil acts as a reservoir. During heavy rainfall, it absorbs and holds water for crop use in the dry periods. The water is held in the soil much as it is held in a sponge.

Following a rain that thoroughly saturates the soil, some water will drain away, and the rest will be held in the soil against the pull of gravity. The amount of moisture held in the soil after such a rain is called *field capacity*.

To get water from the soil, plant roots must exert a force greater than the force that holds the water to the soil particles. The more water the plants withdraw, the

² Parts of this section have been adapted from Mississippi Farm Research (2) and Bulletin 521 of the Mississippi Agricultural Experiment Station (3).

TABLE 4.—*Behavior of soils of several textures at different moisture contents*

Soil	No moisture	Up to 50 percent field capacity	50 to 75 percent field capacity	75 percent to field capacity	Field capacity	Above field capacity
Sandy loam-----	Dry, loose; flows through fingers.	Appears dry; will not form a ball. ¹	Forms ball under pressure, but ball seldom holds together.	Forms weak ball that breaks easily; not slick or slippery.	If squeezed in hand, no free water, but wet imprint on hand.	Free water released if kneaded.
Loam and silt loam.	Dry, powdery; at times forms crusts that break into powder easily.	Somewhat crumbly, but holds together under pressure.	Forms ball; somewhat plastic; at times is slick or slippery under pressure.	Forms ball; very plastic; feels slick or slippery if it contains much clay.	If squeezed in hand, no free water, but wet imprint on hand.	Free water can be squeezed out.
Clay loam and clay.	Hard crust that may be cracked; at times, loose crumbs on surface.	Somewhat plastic; ball forms under pressure; cracks appear in ball.	Forms ball; forms ribbon if pressed between fingers.	Forms ribbon easily; feels slick or slippery.	If squeezed in hand, no free water, but wet imprint on hand.	Puddles; free water on surface.

¹ Ball is formed by squeezing a handful of soil firmly.

greater the force they need to exert to obtain more water. Eventually, the point is reached where plant roots no longer exert enough force to pull the water from the soil, and then the plants wilt. This point is called the *permanent wilting percentage*.

The *available moisture capacity* of a soil is the difference between the amount held at field capacity and the amount that is held at the permanent wilting percentage.

Most plants grow best when the soil moisture is about halfway between field capacity and the permanent wilting percentage. At this level, the soil is adequately aerated, yet there is sufficient moisture for good growth.

The water-holding capacity of a soil is determined mainly by the size and arrangement of the soil particles. In general, the finer the soil particles and the stronger the slope, the more slowly the soil absorbs water. Because sandy soils have coarse particles, they absorb water rapidly, hold little of it, and quickly give up this small amount. Clay soils, in contrast, have very fine particles. Consequently, they soak up water slowly, hold a large amount, and give up this amount slowly. Clay soils still hold an appreciable amount of water after plants have wilted.

Soils best suited to irrigation are those nearly level and of intermediate textures. Soils that take in water slowly because of texture, slope, or both, are difficult to irrigate. Small amounts of water must be applied over long periods, and this increases the cost of irrigating. The intake of water can be improved for both fine- and coarse-textured soils by adding organic matter.

Soil Characteristics and Water Control

This subsection summarizes the soil characteristics most important in controlling water. The various rates of surface runoff and internal drainage are briefly defined. The soils are then listed, by capability groups, for various ranges in rate of surface runoff and internal drainage.

Surface runoff

The movement of water over the land is called surface runoff, or external drainage. The various rates of surface drainage used in this county are defined as follows:

Rapid Surface Runoff: A large part of the water that falls on the land runs off; only a small part moves down through the soil.

Medium Surface Runoff: Moderate amount of water flows away, and a moderate amount enters the soil; free water is on the surface for only short periods; loss of water through surface runoff does not seriously reduce the supply of water for plants.

Slow Surface Runoff: Water flows away so slowly that free water covers the soil for significant periods, passes through the soil profile, or evaporates into the air.

Very Slow Surface Runoff: Water flows away so very slowly that free water lies on the surface for long periods or immediately enters the soil. Much of the water either passes through the soil or evaporates.

Soils with slow surface runoff and little erosion:

Unit 1 (I-1)

Dexter silt loam, nearly level phase.
Dubbs silt loam, nearly level phase.
Dubbs very fine sandy loam, nearly level phase.
Dundee silt loam, nearly level phase.
Dundee very fine sandy loam, nearly level phase.
Pearson silt loam, nearly level phase.

Unit 2 (I-2)

Bosket very fine sandy loam, nearly level phase.

Unit 5 (IIs-1)

Beulah fine sandy loam, nearly level phase.
Beulah fine sandy loam, gently sloping phase.
Bosket very fine sandy loam, gently sloping phase.
Dundee-Clack soils, nearly level phases.
Dundee-Clack soils, gently sloping phases.

Unit 6 (IIs-2)

Tunica silty clay, nearly level phase.

Unit 7 (IIs-3) (the nearly level phases)

Brittain silt loam, nearly level phase.
Forestdale silt loam, nearly level phase.
Forestdale very fine sandy loam, nearly level phase.

Unit 8 (IIs-4) (the nearly level phases)

Alligator silty clay loam, nearly level phase.
Forestdale silty clay loam, nearly level phase.
Sharkey silty clay loam, nearly level phase.

Unit 9 (IIs-6)

Dundee silty clay loam, nearly level phase.

Unit 11 (IIIs-4) (the nearly level phases)

Alligator clay, nearly level phase.
Alligator silty clay, nearly level phase.
Forestdale silty clay, nearly level phase.
Iberia clay.
Sharkey clay, nearly level phase.
Sharkey-Clack soils, nearly level phases.

Soils with medium surface runoff and slight to moderate erosion:

Unit 3 (IIe-1)

Dubbs silt loam, gently sloping phase.
Dubbs very fine sandy loam, gently sloping phase.
Dundee silt loam, gently sloping phase.
Dundee very fine sandy loam, gently sloping phase.
Pearson silt loam, gently sloping phase.

Unit 4 (IIe-4)

Dundee silty clay loam, gently sloping phase.

Unit 7 (IIs-3) (the gently sloping phases)

Forestdale silt loam, gently sloping phase.
Forestdale very fine sandy loam, gently sloping phase.

Unit 8 (IIs-4) (the gently sloping phases)

Forestdale silty clay loam, gently sloping phase.

Unit 11 (IIIs-4) (the gently sloping phases)

Alligator clay, gently sloping phase.
Alligator silty clay, gently sloping phase.
Forestdale silty clay, gently sloping phase.
Sharkey clay, gently sloping phase.
Sharkey-Clack soils, gently sloping phases.

Soils with very slow surface runoff and no erosion:

Unit 10 (IIw-3)

Souva soils.

Unit 12 (IIIw-3)

Forestdale silt loam, level phase.
Forestdale very fine sandy loam, level phase.

Unit 13 (IIIw-5)

Alligator silty clay loam, level phase.
Forestdale silty clay loam, level phase.
Sharkey silty clay loam, level phase.

Unit 14 (IIIw-11)

Alligator clay, level phase.
Alligator silty clay, level phase.
Forestdale silty clay, level phase.
Sharkey clay, level phase.

Unit 15 (IIIw-13)

Dowling soils, overwash phases.
Waverly silt loam, local alluvium phase.

Unit 16 (IVw-1)

Dowling clay.

Soils with medium to moderately rapid surface runoff and moderate to severe erosion:

Unit 17 (IVe-1)

Dundee silt loam, sloping phase.
Dundee very fine sandy loam, sloping phase.
Forestdale silt loam, sloping phase.

Unit 18 (IVe-2)

Alligator clay, sloping phase.
Dundee silty clay loam, sloping phase.
Forestdale silty clay loam, sloping phase.
Sharkey clay, sloping phase.

Internal drainage

The movement of water through the soil is called internal drainage. The various rates of internal drainage used in this county are defined as follows:

Rapid Internal Drainage: Soil is saturated with water only a few hours, so movement of water is a little too rapid for the best growth of the important crops. The soil is free of mottles and has a brownish subsoil.

Medium Internal Drainage: Soil is saturated with water only a few days, or for too short a time to damage roots of crop plants; this is about the best internal drainage for growth of important crops; subsoil is brownish and only slightly mottled, and surface soil is free of mottling.

Slow Internal Drainage: Water moves through soil slowly enough to have an undesirable effect on growth of crops; water may saturate the root zone for periods of a week or two, or long enough to damage the roots of many crop plants; subsoil is grayish and mottled to highly mottled.

Very Slow Internal Drainage: Water moves through the soil too slowly for best growth of crops; root zone may be saturated for a month or two; subsoil is normally dark gray or gray and splotted or highly mottled.

Soils that have medium to rapid internal drainage and need little or no surface drainage:

Unit 1 (I-1)

Dexter silt loam, nearly level phase.
Dubbs silt loam, nearly level phase.
Dubbs very fine sandy loam, nearly level phase.
Dundee silt loam, nearly level phase.
Dundee very fine sandy loam, nearly level phase.
Pearson silt loam, nearly level phase.

Unit 2 (I-2)

Bosket very fine sandy loam, nearly level phase.

Unit 3 (IIe-1)

Dubbs silt loam, gently sloping phase.
Dubbs very fine sandy loam, gently sloping phase.
Dundee silt loam, gently sloping phase.
Dundee very fine sandy loam, gently sloping phase.
Pearson silt loam, gently sloping phase.

Unit 5 (IIs-1)

Beulah fine sandy loam, nearly level phase.
Beulah fine sandy loam, gently sloping phase.
Bosket very fine sandy loam, gently sloping phase.
Dundee-Clack soils, nearly level phases.
Dundee-Clack soils, gently sloping phases.

Soils that have slow to medium internal drainage and need some surface drainage.³

Unit 4 (IIe-4)

Dundee silty clay loam, gently sloping phase.

Unit 6 (IIs-2)

Tunica silty clay, nearly level phase.

Unit 7 (IIs-3)

Brittain silt loam, nearly level phase.
Forestdale silt loam, nearly level phase.
Forestdale silt loam, gently sloping phase.
Forestdale very fine sandy loam, nearly level phase.
Forestdale very fine sandy loam, gently sloping phase.

Unit 8 (IIs-4)

Alligator silty clay loam, nearly level phase.
Forestdale silty clay loam, nearly level phase.
Forestdale silty clay loam, gently sloping phase.
Sharkey silty clay loam, nearly level phase.

Unit 9 (IIs-6)

Dundee silty clay loam, nearly level phase.

Unit 17 (IVe-1)

Dundee silt loam, sloping phase.
Dundee very fine sandy loam, sloping phase.
Forestdale silt loam, sloping phase.

Unit 18 (IVe-2)

Alligator clay, sloping phase.
Dundee silty clay loam, sloping phase.
Forestdale silty clay loam, sloping phase.
Sharkey clay, sloping phase.

Soils that have very slow to slow internal drainage and need extensive surface drainage:

Unit 10 (IIw-3)

Souva soils.

Unit 11 (IIIs-4)

Alligator clay, nearly level phase.
Alligator clay, gently sloping phase.
Alligator silty clay, nearly level phase.
Alligator silty clay, gently sloping phase.
Forestdale silty clay, nearly level phase.
Forestdale silty clay, gently sloping phase.
Iberia clay.
Sharkey clay, nearly level phase.
Sharkey clay, gently sloping phase.
Sharkey-Clack soils, nearly level phases.
Sharkey-Clack soils, gently sloping phases.

Unit 12 (IIw-3)

Forestdale silt loam, level phase.
Forestdale very fine sandy loam, level phase.

Unit 13 (IIIw-5)

Alligator silty clay loam, level phase.
Forestdale silty clay loam, level phase.
Sharkey silty clay loam, level phase.

Unit 14 (IIIw-11)

Alligator clay, level phase.
Alligator silty clay, level phase.
Forestdale silty clay, level phase.
Sharkey clay, level phase.

³ The nearly level phases have slow runoff but need surface drainage, which can be provided by W- or V-type ditches. The gently sloping and sloping areas have medium to rapid runoff and need practices to check erosion. This can be effected by tilling on the contour and allowing the water from the rows to empty into vegetated water outlets, as W-ditches.

Unit 15 (IIIw-13)

Dowling soils, overwash phases.
Waverly silt loam, local alluvium phase.

Soils that have very slow internal drainage and need extensive surface drainage:

Unit 16 (IVw-1)

Dowling clay.

Soil Drainage and Building Sites

Water seeps faster from ponds, irrigation flumes, terraces, and similar excavations on soils of capability units 1 (I-1), 2 (I-2), 3 (IIe-1), and 5 (IIs-1) than on other soils of the county because they have more permeable and in many places sandier subsoils. However, the loss of water is often negligible because silt and clay particles settle and soon form a lining in the excavations. Only a small amount of water seeps from excavations in soils that have clayey subsoils.

Soils of capability units 1 (I-1), 2 (I-2), 3 (IIe-1), and 5 (IIs-1) that have a low clay content do not expand in wet seasons and contract in dry seasons as the clayey soils do. Therefore they are desirable sites for buildings and public roads. Unsurfaced roads on these loamy soils that have medium internal drainage can be used throughout the year. Soils in capability units 7 (IIs-3) and 9 (IIs-6) are the next most desirable locations for buildings and roads. The soil in capability unit 16 (IVw-1) is the least desirable for building sites and roads because of its extremely clayey profile. The "soupy" clay subsurface layers often cause highways and building foundations to sag.

The Soils of Sunflower County

Shown on the large soil map at the back of this report are 60 different soils and 1 miscellaneous land type, called Swamp. To understand these soils readily, it is helpful to group them so that their similarities and differences can be understood and remembered. Therefore, in this section, the soils of the county are first discussed as they occur in geographic patterns on broad tracts of land. A colored soil map at the back of the report shows these patterns, or general soil areas. After the discussion of general soil areas, the soil series—groups of single soils basically alike—are named as they occur on natural levees, slack-water areas, and depressions. Finally, the series and each of the 60 soils are described in alphabetical order.

General Soil Areas

In mapping a county or other large tract, it is fairly easy to see definite changes as one travels from place to place. There are many obvious changes, among them changes in shape, gradient, and length of the slopes; in the course, depth, and speed of the streams; in the width of the bordering valleys or levees; in the kinds of native plants; and even in the kinds of agriculture. With these more obvious changes there are less easily noticed changes in the pattern of soils. The soils change along with the other parts of the environment.

By drawing lines around the different patterns of soils

on a small map, one may obtain a map of the general soil areas, or as they are sometimes called, soil associations. Such a map is useful to those who want only a general idea of the soils, who want to compare different parts of a county, or who want to locate large areas suitable for some particular kind of agriculture or other broad land use.

The four main soil areas, or kinds of soil patterns, in Sunflower County are shown on the colored map at the back of this report. Scattered among these four main areas is a fifth pattern of soils not shown because it occurs in low swags and depressions in areas too small to delineate on a map of the size used.

1. DUNDEE-DUBBS (MOSTLY SILT LOAM AND VERY FINE SANDY LOAM SURFACE SOILS)

These soils occur mainly on nearly level parts of old natural levees. They formed from a mixture of sand, silt, and clay, and the surface layers are chiefly silt loam and very fine sandy loam.

About 70 percent of the acreage is made up of somewhat poorly drained to moderately well drained Dundee soils. Some 17 percent is occupied by Dubbs soils and associated small areas of Bosket and Beulah soils, which range from moderately well drained to somewhat excessively drained. The rest of the acreage is Dowling, Forestdale, and Souva soils that are poorly drained to somewhat poorly drained and occur in low areas.

All the soils except the Souva and Dowling have moderate profile development and are partly leached. The soils are slightly to strongly acid. Most of them are slightly eroded, but small areas are moderately eroded.

Most of this land has been cleared and is used for most of the local crops, but chiefly for cotton. Soils in this group are considered the best in the county for agriculture. Most of them are in capability class I.

2. BRITAIN-PEARSON-DEXTER (SILT LOAM SURFACE SOILS)

This group of soils occurs on nearly level parts of old natural levees in the western part of the county. Most of the soils formed from highly silty material, but soils from sand, silt, and clay are mingled with them. The surface layers are mostly silt loam.

Approximately 42 percent of the acreage consists of the somewhat poorly drained to moderately well drained Pearson and Dundee soils. At the higher elevations are the Dexter soils, with smaller areas of Dubbs soils, which together occupy about 16 percent of the acreage. The Dexter and Dubbs soils are moderately well drained to well drained. The rest of the soils in this group—the Britain, Forestdale, Dowling, and Waverly—are somewhat poorly drained to poorly drained.

Soils of this group show some profile development and have been partially leached. They are medium to strongly acid, and most of them are only slightly eroded.

These soils are used mostly for cotton, oats, and soybeans. A small acreage is used for mixtures of grass and legumes. The better drained soils of this group are among the best in the county for agriculture. The soils of this group are mainly in capability classes I and II.

3. FORESTDALE (MOSTLY SILT LOAM AND SILTY CLAY LOAM)

This soil group occurs in a large part of the county, mostly in nearly level areas but partly in level areas and on gentle slopes. Generally, these soils are on the lower parts of the old natural levees, in areas transitional

between the old natural levees and the slack-water areas, or between low natural levees that border the shallow channel streams that once flowed through the slack-water areas.

These poorly drained to somewhat poorly drained soils were formed from sand, silt, and clay and have surface layers of silt loam, silty clay loam, and very fine sandy loam. Forestdale silt loams and Forestdale silty clay loams predominate, but small amounts of the Dundee silty clay loams, Alligator silty clay loams, and Forestdale very fine sandy loams are included. A few spots of Dundee silt loams and Dundee very fine sandy loams, and a fairly large acreage of Dowling soils, overwash phases, are also included.

The soils of this group have been free of flooding long enough to have some profile development and have been in place long enough to be partially leached. They are slightly acid to very strongly acid. Most of the soils are only slightly eroded, but scattered spots have been moderately eroded.

Most of the land has been cleared and is used for cultivated crops. A fairly large acreage is used for grasses and legumes. The soils are mainly in capability class II.

4. ALLIGATOR-SHARKEY-DOWLING (MOSTLY CLAY AND SILTY CLAY SURFACE SOILS)

This group occurs on nearly level to level broad areas, in depressions, or on low ridges in the slack-water areas. A small acreage is gently sloping. These poorly drained, clay to silty clay soils were formed from sediments that had a high clay content.

The Alligator, Sharkey, and Dowling are the chief soils, but a fairly large area of Forestdale silty clay and a small area of Iberia clay are included.

Soils of this group normally have less profile development and have been flooded more recently than the Dundee-Dubbs group, or the Brittain-Pearson-Dexter group. Soils of this group are slightly acid to strongly acid. They are mostly noneroded or slightly eroded, but some small areas are moderately eroded.

Rice, grasses mixed with legumes, and, where surface drainage is adequate, oats and some row crops do well on this land. Many trees are also suited. Most of the woodland in the county consists of the soils of this group. The soils of this group are mainly in capability classes III and IV.

Soil Series and Their Relations

Sediments from the Mississippi River and its tributaries have given rise to the soils of Sunflower County. The county is on the Mississippi River flood plain, which is made up of several coalescing deltas that have been building up during the last few thousand years. The deltas were formed when the swift waters of the Mississippi flowed into the sea that once covered this area. Other overflowing tributary streams have added more sediment.

When the streams overflowed, the heaviest soil particles, sand and other coarse materials, were deposited first. The coarse materials form the sandy natural levees closest to the stream. These levees are normally the highest points of the flood plain. Small particles, as silt, dropped out when the water slowed down with increasing distance from the channel. This silty deposit forms the lower part of

the natural levees. Clay particles, the smallest and lightest of the river sediments, were carried the longest distance and dropped in quiet waters. Thus, clay and silty clay occur in large slack-water areas of this county.

The deposit of sediments was not uniform, because the speed of the sediment-laden water varied. At different times, unlike soil materials were deposited in the same given area. Generally, however, coarse soils are on old natural levees or ridges near streams, finer soils are on lower slopes back from the streams, and fine clays are on nearly level slack-water areas farthest from the streams (fig. 6).

The cutting of new stream channels also complicates the pattern of soils. The natural levees and the stream bed are gradually built higher than the backswamps and surrounding flood plain. Then, when the river floods again, it may break out of its channel and cut a new course on the lower levels of the flood plain. Thus, through long periods of time, a broad river valley such as the Mississippi becomes cut up by many old abandoned river channels.

The soils in the county were derived from many different sources, so they vary greatly. They belong to 15 series, which fall into 3 groups: (1) Soils of the natural levees, (2) soils of the slack-water areas, and (3) soils of the depressions. A brief description of these groups is given on the following pages. The series are described in the section, Descriptions of Soils, and their characteristics are summarized in the supplement to the soil map at the back of this report.

Soils of the old natural levees

Soils of the old natural levees border rivers, bayous, and channels of former streams. They account for about half of the land in the county. The soils have weathered to the extent that most of them have definite horizons in their profile, and they are partially leached.

The soils on the old levees can be placed in two groups according to source of parent material: (1) Stratified alluvium of fine, medium, and coarse texture, and (2) soils mostly from highly silty alluvium. The two groups will be discussed separately.

SOILS FORMED FROM STRATIFIED ALLUVIUM OF FINE TO COARSE TEXTURE

The soils of the old natural levees that were derived from stratified alluvium can be arranged according to drainage as follows: Beulah, Bosket, Dubbs, Dundee, and Forestdale. Beulah soils are somewhat excessively drained and have fine sandy loam surface layers. At the other extreme are the poorly drained to somewhat poorly drained Forestdale soils, which have surface layers ranging from very fine sandy loam to silty clay.

SOILS FORMED MOSTLY FROM HIGHLY SILTY ALLUVIUM

The soils of the old natural levees that were derived mainly from silty alluvium are members of the Dexter, Pearson, and Brittain series. The range from best drainage to poorest is from the Dexter, through the Pearson, and to the Brittain. The Dexter soil is moderately well drained and well drained; the Pearson soils are somewhat poorly drained and moderately well drained; and the Brittain soil is poorly drained and somewhat poorly drained.

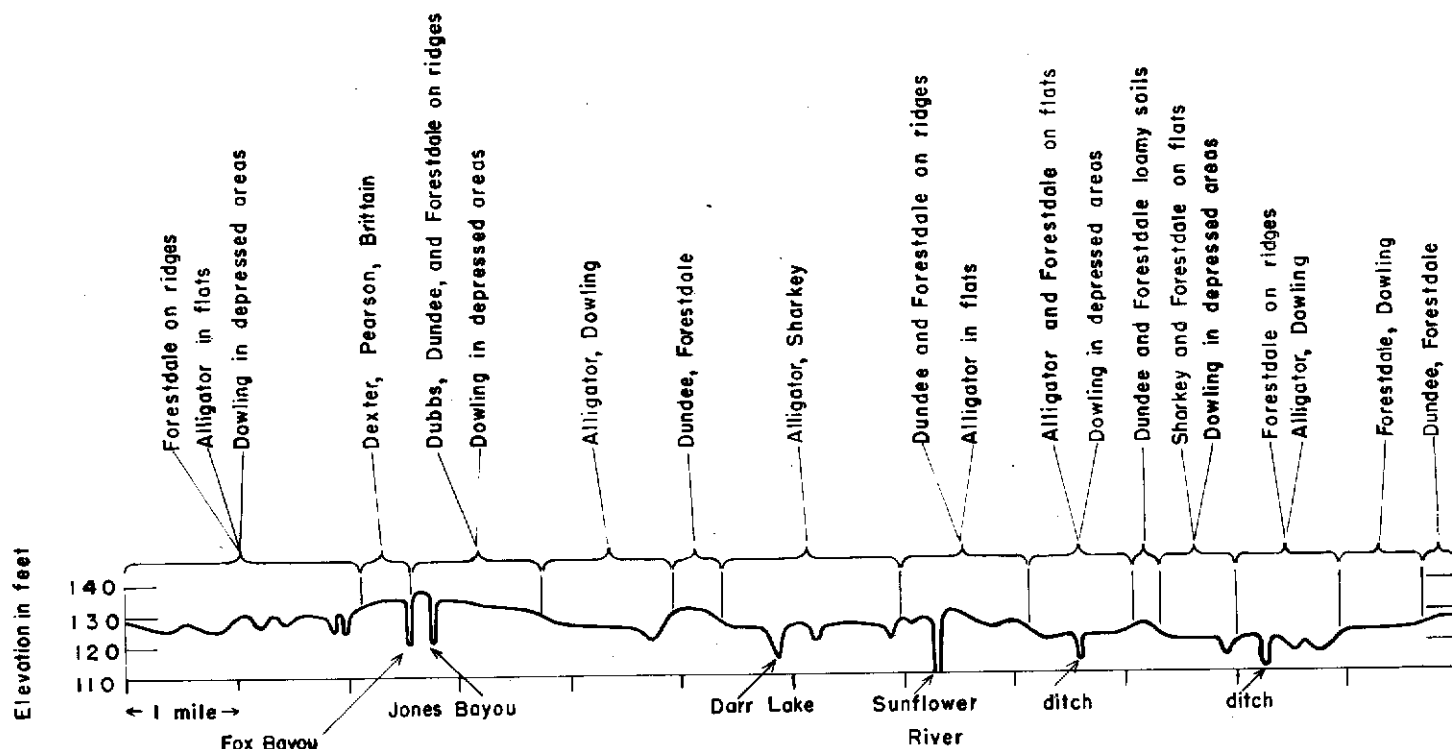


Figure 6.—East-west cross section, 2 miles south of Doddsville, showing relation of soils to topography.

The surface layers of the soils of these three series are silt loam. Normally the underlying layers are finer in texture.

Soils of slack-water areas

These soils were derived mostly from clayey alluvium. As sediment-laden streams overflow into areas of slack water, they are slowed down and the fine-textured clayey sediments drop out of suspension. In this way alluvium is built up. The soils thus formed have poor drainage and little profile development.

The series in this soil group are the Alligator, Iberia, Sharkey, and Tunica. All are poorly drained except the Tunica, which is somewhat poorly drained. The surface layers are mostly clay. A few of the soils have silty clay loam surface layers, and some are silty clay. The acreage of Tunica and Iberia soils is too small to be of much value in agriculture.

Soils of the depressions

The soils of the depressions were formed mostly from alluvium of fine to medium texture that was washed down from higher surrounding soils, and also from alluvium washed in by the Mississippi River. They are underlain by clay that was deposited in slack-water areas. They are excessively moist and are flooded much of the time.

These soils are in low depressions that are a part of the natural drainage pattern. They can be used to advantage as a location for secondary and primary drainage ditches.

The series in this group are the Dowling, Souva, and Waverly. Dowling soils are poorly to very poorly drained,

the Waverly soil is poorly drained, and the Souva soils are somewhat poorly drained. All these soils have little profile development. The surface layer of the Dowling soils is clay to silt loam. The Souva and Waverly soils have a slightly coarser surface layer that ranges from silty clay loam to silt loam. The acreage of Souva and Waverly soils is too small to be of much value in agriculture.

Descriptions of Soils

This subsection is provided for those who want detailed information about soils. It describes the single soils, or mapping units, in the county; that is, the areas on the detailed soil map that are bounded by lines and identified by a letter symbol. For more generalized information about soils, the reader can refer to the subsection, Soil Series and Their Relations, in which groups of soils basically alike are discussed; or to the subsection, General Soil Areas, in which the broad patterns of soils are explained.

In this subsection the soils are described in approximately alphabetic order. All the soils of one series that have the same texture in the surface layer are together. For example, all the Alligator soils that have a clay surface soil come together, and then, all the Alligator soils that have a silty clay surface soil.

In each series, only one soil is described in detail for each kind of surface soil texture. An important part of this description is the soil profile, a record of what the soil surveyor saw and learned when he dug into the ground. It is to be assumed that all the other soils in a series that have this same texture in the surface layer have basically the same kind of profile. To illustrate, a detailed profile

is given for Alligator clay, nearly level phase, and the reader is to conclude that Alligator clay, level phase, Alligator clay, gently sloping phase, and Alligator clay, sloping phase, also have this same kind of profile.

For each soil, the slope, the erosion, and the similar properties that distinguish it from the other soils are pointed out. Frequently, the characteristics emphasized for a single soil are those that directly affect its management. For example, there are four soils in the Alligator series that have a clay surface layer and are similar in profile, but these four are different in slope, a characteristic that affects their management.

The location and distribution of the single soils are shown on the soil map at the back of this report. Their approximate acreage and proportionate extent are given in table 5. It will be helpful to refer to the section, Soil Survey Methods and Definitions, where "series," "type," "phase," and other special terms used in describing soils are listed.

ALLIGATOR SERIES

The Alligator soils are slowly permeable, very plastic, and poorly drained. The dark grayish-brown to grayish-

brown clayey surface soil is underlain by a prominently mottled subsoil of gray clay. The soils in this series were derived from alluvium of fine texture that was washed in by the Mississippi River. Locally they are called gumbo or buckshot land. These soils are slightly to very strongly acid, and they have a massive to weakly developed subangular blocky subsoil. They occur in slack-water areas throughout the county and are associated with the Sharkey, Dowling, and Forestdale soils.

Alligator soils are lighter in color throughout than the Sharkey. They generally are more acid and have lighter colored upper profiles than the Dowling soils. They do not occur in depressions as do the Dowling soils. Normally, the Alligator soils occur on lower elevations than the Forestdale soils, they have a more poorly developed subsoil, and their horizons are finer textured.

Alligator clay, level phase (0 to ½ percent slopes) (Aa).—This soil resembles Alligator clay, nearly level phase, in most profile characteristics, but it occurs in flat areas. Surface runoff and internal drainage are very slow; the profile is plastic and sticky throughout. In cultivated fields the surface soil, a dark grayish-brown clay, is under-

TABLE 5.—Approximate acreage and proportionate extent of the soils mapped

Soil	Area	Extent	Soil	Area	Extent
Alligator clay:	<i>Acres</i>	<i>Percent</i>	Forestdale silt loam:	<i>Acres</i>	<i>Percent</i>
Level phase.....	20,651	4.7	Level phase.....	1,251	0.3
Nearly level phase.....	51,175	11.5	Nearly level phase.....	55,942	12.6
Gently sloping phase.....	2,351	.5	Gently sloping phase.....	1,685	.4
Sloping phase.....	120	(¹)	Sloping phase.....	138	(¹)
Alligator silty clay:			Forestdale silty clay:		
Level phase.....	2,216	.5	Level phase.....	92	(¹)
Nearly level phase.....	31,885	7.2	Nearly level phase.....	8,078	1.8
Gently sloping phase.....	1,550	.4	Gently sloping phase.....	1,133	.3
Alligator silty clay loam:			Forestdale silty clay loam:		
Level phase.....	210	(¹)	Level phase.....	630	.1
Nearly level phase.....	3,978	.9	Nearly level phase.....	40,467	9.1
Beulah fine sandy loam:			Gently sloping phase.....	2,057	.5
Nearly level phase.....	266	.1	Sloping phase.....	249	.1
Gently sloping phase.....	112	(¹)	Forestdale very fine sandy loam:		
Bosket very fine sandy loam:			Level phase.....	6	(¹)
Nearly level phase.....	897	.2	Nearly level phase.....	2,055	.5
Gently sloping phase.....	216	.1	Gently sloping phase.....	209	(¹)
Brittain silt loam, nearly level phase.....	922	.2	Iberia clay.....	432	.1
Dexter silt loam, nearly level phase.....	429	.1	Pearson silt loam:		
Dowling clay.....	49,117	11.1	Nearly level phase.....	1,099	.3
Dowling soils, overwash phases.....	40,101	9.0	Gently sloping phase.....	42	(¹)
Dubbs silt loam:			Sharkey clay:		
Nearly level phase.....	2,899	.7	Level phase.....	4,487	1.0
Gently sloping phase.....	174	(¹)	Nearly level phase.....	11,517	2.6
Dubbs very fine sandy loam:			Gently sloping phase.....	638	.1
Nearly level phase.....	9,502	2.1	Sloping phase.....	34	(¹)
Gently sloping phase.....	613	.1	Sharkey silty clay loam:		
Dundee silt loam:			Level phase.....	97	(¹)
Nearly level phase.....	42,885	9.7	Nearly level phase.....	195	(¹)
Gently sloping phase.....	2,662	.6	Sharkey-Clack soils:		
Sloping phase.....	133	(¹)	Nearly level phases.....	284	.1
Dundee silty clay loam:			Gently sloping phases.....	878	.2
Nearly level phase.....	5,143	1.2	Souva soils.....	320	.1
Gently sloping phase.....	1,650	.4	Tunica silty clay, nearly level phase.....	270	.1
Sloping phase.....	245	.1	Waverly silt loam, local alluvium phase.....	80	(¹)
Dundee very fine sandy loam:					
Nearly level phase.....	20,573	4.6	Subtotal.....	430,555	97.1
Gently sloping phase.....	1,815	.4	Other areas, not mapped in detail.....	12,965	2.9
Sloping phase.....	240	.1			
Dundee-Clack soils:			Total.....	443,520	100.0
Nearly level phases.....	522	.1			
Gently sloping phases.....	938	.2			

¹ Less than 0.1 percent.

lain by a gray clay subsoil that is highly mottled with gray, brown, and yellow.

Use suitability.—Yields are unpredictable. The soil can be satisfactorily tilled for only short periods, as it is too plastic and sticky when wet and too hard when dry. The soil needs extensive drainage to grow most row crops. Moderate amounts of nitrogen fertilizer must be added for best yields of cotton, corn, oats, or market vegetables. Rice, hay, and pasture probably would be better suited to this soil. This soil is in capability unit 14 (IIIw-11).

Alligator clay, nearly level phase ($\frac{1}{2}$ to 3 percent slopes) (Ab).—This is a poorly drained, slightly acid to strongly acid soil. It has developed in slack-water areas on the flood plain. The parent material is light-colored, fine-textured alluvium washed in by the Mississippi River. Locally this soil is called gumbo or buckshot land. Surface runoff is slow, and internal drainage is slow to very slow.

Profile from a moist cultivated area (SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 10, T. 23 N., R. 3 W.):

- 0 to 3 inches, dark grayish-brown (10YR 4/2) granular clay; very plastic when wet, very firm when moist, and very hard when dry; medium acid.
- 3 to 25 inches, gray (10YR 5/1) clay, usually prominently mottled with yellowish brown (10YR 5/6); very plastic when wet, very firm when moist, and very hard or extremely hard when dry; massive when wet, weakly developed subangular blocky structure when dry; strongly acid.
- 25 to 42 inches +, gray (10YR 6/1) clay, usually mottled with brown, gray, and yellow; very plastic; massive when wet, weakly developed subangular blocky structure when dry; medium acid.

Included with this soil are small areas of Sharkey clay and Alligator silty clay.

Use suitability.—When first cleared, this soil has a high content of organic matter, but this decreases rather rapidly. Nitrogen fertilizer ought to be added for best yields, and organic matter should be added when feasible. Drainage is a problem. The soil can be tilled easily for only short periods, as it is too plastic and sticky when wet and too hard when dry. Wide deep cracks form during the long dry season. All the common crops are grown, but rice, soybeans, hay, and pasture are probably better suited (fig. 7). Areas on stronger slopes, as

on ridge and depressional areas or near small bayous, are better suited to row crops because they have better surface drainage. This soil is in capability unit 11 (III-4).

Alligator clay, gently sloping phase (3 to 7 percent slopes) (Ac).—This is a poorly drained, very plastic soil derived from light-colored, fine-textured alluvium that was washed in by the Mississippi River. It is scattered throughout the county on narrow, fairly long slopes.

This soil is very similar to Alligator clay, nearly level phase, except that it occurs on stronger and more varied slopes, has faster surface runoff, and is slightly more eroded. Most areas include a few eroded spots that have lost 25 to 75 percent of the surface layer. The dark grayish-brown clay surface soil is underlain by gray, highly mottled, very plastic clay that greatly retards internal drainage.

Use suitability.—This soil is normally used for the crops grown on the surrounding nearly level clays and silty clays. Many of its areas are too small to be managed separately. Crop rows should be run on the contour, or close-growing crops should be used, because this soil erodes fairly easily. This soil is in capability unit 11 (III-4).

Alligator clay, sloping phase (7 to 10 percent slopes) (Ad).—This soil is similar to Alligator clay, gently sloping phase, except that it occurs on stronger and more varied slopes, has faster surface runoff, and is slightly more eroded. The few areas occur as narrow bands on slopes along former stream channels.

The surface soil, normally a dark grayish-brown granular clay, is underlain by a subsoil of highly mottled gray clay. Small areas of Alligator silty clays are included with this soil.

Use suitability.—Where cleared, this soil should be seeded to permanent cover, as it erodes easily. This soil is in capability unit 18 (IVe-2).

Alligator silty clay, level phase (0 to $\frac{1}{2}$ percent slopes) (Ae).—This soil is similar to Alligator silty clay, nearly level phase, except that it occurs in flat places. These small to fairly large slack-water areas have slow surface runoff and very slow internal drainage.

In cultivated fields the surface soil is grayish-brown to dark grayish-brown silty clay. Highly mottled gray clay underlies the surface soil. The profile is very sticky and very plastic throughout. Small areas of Alligator clay were included with this soil.

Use suitability.—Extensive drainage is needed to grow all the common row crops. Rice, hay, and pasture probably are better suited than row crops. This soil is in capability unit 14 (IIIw-11).

Alligator silty clay, nearly level phase ($\frac{1}{2}$ to 3 percent slopes) (Ag).—This is a poorly drained, slightly acid to very strongly acid soil. The small to large areas occur in slack-water areas throughout the county. The parent material is light-colored, fine-textured alluvium washed in by the Mississippi River.

This soil is similar to the nearly level phase of Alligator clay, except that its surface layer is deeper, slightly lighter colored, and easier to till. It occurs at higher elevations than the Alligator clays, and in many places the soil is transitional between the Alligator and the Forestdale soils.



Figure 7.—Oats, a good crop for Alligator clays.

Profile from a moist cultivated area (NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 2, T. 17 N., R. 4 W.):

0 to 4 inches, grayish-brown to dark grayish-brown (10YR 5/2 to 4/2) granular silty clay; plastic, very firm, and very hard; medium acid.

4 to 30 inches, gray (10YR 5/1) clay prominently mottled with yellowish brown (10YR 5/6); very plastic, very firm, and very hard or extremely hard; massive when wet, weakly developed subangular blocky structure when dry; strongly acid.

30 inches +, gray (10YR 6/1) clay mottled with shades of gray, brown, and yellow; very plastic; massive when wet, weak subangular blocky structure when dry; medium acid.

Small areas of Alligator clays and Alligator silty clay loams were included with this soil.

Use suitability.—This soil is cropped and managed in the same way as Alligator clay, nearly level phase. For best yields of cotton, corn, oats, and truck crops, the soil needs drainage and a nitrogen-supplying fertilizer. This soil is in capability unit 11 (III-4).

Alligator silty clay, gently sloping phase (3 to 7 percent slopes) (Ah).—The parent material of this poorly drained soil is light-colored, fine-textured alluvium washed in by the Mississippi River. The soil occurs in narrow bands on some of the stronger slopes throughout the slack-water areas. It is similar to Alligator silty clay, nearly level phase, in most profile characteristics, but it occupies stronger and more varied slopes, has faster surface runoff, and is slightly more eroded. A few moderately eroded spots that have lost from 25 to 75 percent of the surface layer are included with this soil.

The profile in a cultivated field usually has a grayish-brown to dark grayish-brown plastic silty clay surface soil, underlain by a highly mottled, gray, very plastic clay that greatly retards the downward movement of water.

In some places small areas of Alligator clay and Alligator silty clay loam were mapped with this soil.

Because of its limited acreage, this soil is planted to the same crops as the surrounding soils. Contour tillage, rotation of close-growing crops, maintaining permanent cover, and similar good management practices are needed to control erosion. This soil is in capability unit 11 (III-4).

Alligator silty clay loam, level phase (0 to $\frac{1}{2}$ percent slopes) (Ak).—This is a poorly drained, slowly permeable soil. It is similar to Alligator silty clay loam, nearly level phase, except that it occurs on level areas, is wet for longer periods, and requires much more drainage. It occurs in rather small areas.

The grayish-brown silty clay loam surface layer is underlain by highly mottled, gray, very plastic clay.

Use suitability.—Drainage and nitrogen-supplying fertilizers are needed for best yields of such crops as cotton and corn. Like the level phases of Alligator clay and Alligator silty clay, this soil is best suited to rice, hay, soybeans, and pasture, or if it has not been cleared, to the native forest of deciduous hardwoods. This soil is in capability unit 13 (IIIw-5).

Alligator silty clay loam, nearly level phase ($\frac{1}{2}$ to 3 percent slopes) (Am).—This is a poorly drained, slightly acid to very strongly acid soil. It is in slack-water areas on the higher parts of the flood plain. The parent material is light-colored, fine-textured alluvium washed in by the Mississippi River.

This soil is associated with the nearly level phases of

Alligator silty clay and Forestdale silty clay loam. It frequently occurs with those soils in areas transitional between modal, or typical, Forestdale and Alligator soils. In these transitional areas, the soils all have a gray, fine-textured subsoil. This nearly level Alligator silty clay loam has a fine-textured subsoil of clay, more than 30 inches deep. In contrast, the nearly level Forestdale silty clay loam has a silty clay subsurface layer that is frequently stratified with layers of silty clay loam or sandy clay loam at a depth of less than 30 inches. The Forestdale silty clay loam has a subsurface layer that contains more sand and more brownish mottlings than the Alligator.

Profile from a moist cultivated area (SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 17, T. 17 N., R. 4 W.):

0 to 4 inches, grayish-brown (10YR 5/2) silty clay loam; plastic; firm, and very hard; very strongly acid.

4 to 36 inches, gray (10YR 5/1 to 6/1) clay prominently mottled with brown and yellowish brown (10YR 5/3 and 5/6); very plastic, very firm, and very hard; massive when wet, weakly developed medium subangular blocky structure when dry; strongly acid.

36 inches +, gray (10YR 6/1) clay distinctly mottled with brown, gray, and yellow; very plastic; massive when wet, weak subangular blocky structure when dry; strongly acid to medium acid.

Use suitability.—All the crops commonly grown on Alligator silty clay, nearly level phase, are grown on this soil. Cotton yields slightly more and is a little more reliable crop on this soil. Nitrogen fertilizer and some artificial drainage are needed for cotton, corn, and truck crops. This soil is in capability unit 8 (II-4).

BEULAH SERIES

The Beulah soils are somewhat excessively drained, medium acid, and sandy. The horizons are indistinct or almost lacking. The parent material was coarse-textured alluvium washed in by the Mississippi River. Soils in this series occur on natural levees, normally near the Sunflower River. They are associated with Bosket soils, but they have coarser profiles because they had coarser parent material. Also, they have less distinct horizons than the Bosket soils and are slightly more droughty. The Beulah soils lack the sandy clay loam subsurface layer that is characteristic of Bosket soils.

These soils are productive if moisture is plentiful, but crops are often affected by lack of moisture in dry growing seasons.

Beulah fine sandy loam, nearly level phase ($\frac{1}{2}$ to 3 percent slopes) (Ba).—This is a somewhat excessively drained, medium acid, sandy soil. Internal drainage is rapid, so the soil is slightly droughty in dry years. The soil occurs in association with Bosket soils on old natural levees, mostly in the vicinity of the Sunflower River.

Profile from a cultivated area (NW corner sec. 2, T. 21 N., R. 4 W.):

0 to 7 inches, light brownish-gray (10YR 6/2, dry) fine sandy loam; very friable; medium acid.

7 to 26 inches, brown to yellowish-brown (10YR 5/3 to 5/4, dry) fine sandy loam; very friable; medium acid; in places the color ranges to grayish brown, and texture, to a loam.

26 to 42 inches +, very pale brown (10YR 8/3, dry) sandy loam to loamy sand; very friable; single grain; slightly acid.

Small areas with very fine sandy loam surface layers are included with this soil.

Use suitability.—Practically all of Beulah fine sandy loam, nearly level phase, has been cleared and is now used

for corn, cotton, pasture, oats, and truck crops. Oats and early maturing corn grow well on this somewhat droughty soil. Cotton is still grown extensively. This soil often occurs in such small areas that it is planted to the same crops as the surrounding soils. The rapid internal drainage of the coarse-textured subsoil leaches out applied minerals in a short time. Consequently, row crops should receive two small applications of fertilizer rather than a single large one. This soil is in capability unit 5 (IIs-1).

Beulah fine sandy loam, gently sloping phase (3 to 7 percent slopes) (Bb).—This somewhat excessively drained sandy soil occurs on short, narrow slopes, mostly near the Sunflower River. It is similar to Beulah fine sandy loam, nearly level phase, except that it has stronger and more varied slopes and slightly more erosion.

In cultivated fields the light brownish-gray, very friable fine sandy loam surface layer is underlain by a brown to yellowish-brown very friable fine sandy loam.

Some moderately eroded areas were mapped with this soil.

Use suitability.—This soil normally occurs in such small areas that it is planted to cotton along with the surrounding soils. Crops for winter grazing are suited. Oats can be grown either for grain or winter grazing. This soil is in capability unit 5 (IIs-1).

BOSKET SERIES

The Bosket soils are well drained, slightly acid to medium acid, deep, and productive. They were derived mostly from coarse-textured alluvium washed in by the Mississippi River. They occur on old natural levees and are associated with Dubbs and Beulah soils. The Bosket soils were formed from coarser textured alluvium than the Dubbs and have less distinct horizons. The Bosket soils normally have a sandy clay loam subsurface layer that is lacking in the Beulah soils.

Bosket very fine sandy loam, nearly level phase ($\frac{1}{2}$ to 3 percent slopes) (Bc).—This is a well-drained, slightly acid to medium acid soil. It has developed mainly from coarse-textured alluvium washed in by the Mississippi River. It occurs with Dubbs soils, and in places with the Beulah soils, on old natural levees. This soil, unlike Dubbs very fine sandy loam, has a mottle-free profile and contains no layer having a texture finer than a sandy clay loam.

Modal profile from a cultivated area (E $\frac{1}{2}$ NW $\frac{1}{4}$ sec. 33, T. 23 N., R. 3 W.):

- 0 to 7 inches, light brownish-gray (10YR 6/2, moist) very fine sandy loam; very friable; slightly acid.
- 7 to 24 inches, dark-brown to brown (10YR 4/3 to 5/3, moist) sandy clay loam free of mottles; friable; slightly hard when dry; weakly defined medium to fine blocky structure; medium acid.
- 24 to 42 inches +, yellowish-brown (10YR 5/4, moist) sandy loam; very friable; massive; slightly acid to medium acid.

Below the subsoil, the texture of this soil may range from fine sandy loam to loamy sand. Small areas of Dubbs very fine sandy loams and of Bosket silt loams, loams, and fine sandy loams are included in places in the mapping unit.

Use suitability.—This soil is easily tilled. It is well drained but retains adequate moisture in the subsoil. If well fertilized, this is a good soil for row crops, except that it may be slightly droughty for late corn, soybeans,

sorghum, millet, and sudangrass. Cotton is the principal crop. This soil is in capability unit 2 (I-2).

Bosket very fine sandy loam, gently sloping phase (3 to 7 percent slopes) (Bd).—This well-drained deep soil normally has a light brownish-gray very fine sandy loam surface layer underlain by dark-brown to brown sandy clay loam. It is similar to Bosket very fine sandy loam, nearly level phase, but it has a thinner surface layer and occurs in short, narrow bands on stronger and more varied slopes. A few small, moderately eroded areas are included with this soil.

Use suitability.—Good management, including use of close-growing crops, contour tillage, and permanent cover, is needed to control erosion. This soil is in capability unit 5 (IIs-1).

BRITTAIN SERIES

The soils of the Brittain series are poorly drained to somewhat poorly drained. Their light-gray to light brownish-gray surface soil is underlain by a highly mottled, gray to light brownish-gray, silty subsoil. The Brittain soils have poorer drainage than the Dexter and Pearson soils. They normally have a grayer profile than the Pearson. Unlike the Forestdale soils, they are silty throughout the profile. In this county the only soil in this series is Brittain silt loam, nearly level phase.

Brittain silt loam, nearly level phase ($\frac{1}{2}$ to 3 percent slopes) (Be).—This poorly drained to somewhat poorly drained, medium acid to strongly acid soil has developed from highly silty alluvium. It is silty throughout and is slowly permeable. The small areas occur on stream terraces near Jones, Fox, Porter, and Indian Bayous. The soil is associated with the Pearson and Forestdale silt loams. It differs from the Pearson silt loams in having grayish rather than brownish colors. From the Forestdale silt loams, it differs in having a silty clay subsoil rather than a silty clay loam subsoil.

Modal profile from a cultivated field (center of sec. 31, T. 20 N., R. 5 W.):

- 0 to 7 inches, light-gray (10YR 7/2, dry) to light brownish-gray (10YR 6/2, dry) mellow silt loam; medium acid.
- 7 to 16 inches, light-gray (10YR 7/1, dry) to light brownish-gray (10YR 6/2, dry) silt loam or silty clay loam, distinctly mottled with brown and yellow; friable; weak medium subangular blocky structure; strongly acid.
- 16 to 42 inches +, gray to light brownish-gray (10YR 6/1 to 6/2, moist) silt loam or silty clay loam prominently mottled with yellow and brown; moderately developed medium subangular blocky structure; medium to strongly acid; may contain 2- to 4-inch layers of silty clay at various depths.

Many small areas of this soil contain profiles typical of the Forestdale silt loams, as well as some profiles transitional between this soil and those of the Forestdale silt loams. In these areas, however, the typical Brittain silt loam profile is dominant.

Use suitability.—Most of this soil has been cleared and is now used for cotton, oats, soybeans, and the other crops commonly grown. Nitrogen fertilizer, organic matter, and improved surface drainage will increase yields. This soil is in capability unit 7 (IIs-3).

DEXTER SERIES

In the Dexter series are moderately well drained to well drained soils. They have a medium acid, friable, pale-brown silty surface soil underlain by a faintly mottled, dark-brown subsoil. The parent material was mostly silty alluvium. The only soil of this series in the county

is Dexter silt loam, nearly level phase. This soil occurs on natural levees near Jones, Fox, Porter, and Indian Bayous in the western part of the county. It is better drained than the associated Pearson and Brittain soils. Typically the Dexter soil has a dark-brown to yellowish-brown, faintly mottled to mottle-free subsurface layer. This differentiates it from the Pearson soils, which have a lighter and more mottled subsurface layer. The Dexter soil has a coarser subsoil than the Dubbs soils, and its horizons and structure are not so well developed.

Dexter silt loam, nearly level phase ($\frac{1}{2}$ to 3 percent slopes) (Da).—This moderately well drained to well drained, productive, silty soil occurs on natural levees. It is associated with Pearson and Brittain silt loams near Jones, Fox, Porter, and Indian Bayous. It was derived predominantly from silty alluvium.

Modal profile from a moist cultivated field (center of sec. 6, T. 20 N., R. 5 W.):

- 0 to 7 inches, pale-brown (10YR 6/3) silt loam; very friable; medium acid.
- 7 to 14 inches, dark-brown (10YR 4/3) silty clay loam to silt loam; free of mottles to faintly mottled; friable; weak subangular blocky structure; medium acid; layer may be dark brown to brown.
- 14 to 42 inches +, yellowish-brown to dark-brown (10YR 5/4 to 4/3) faintly mottled silty clay loam to silt loam; friable; weak subangular blocky structure; medium acid.

Use suitability.—This is one of the best soils in the county. Some areas that have surface soils slightly coarser than a silt loam are included. Most of this soil has been cleared and is planted to cotton. Moderate amounts of nitrogen fertilizer are needed for cotton, corn, oats, and market vegetables. When feasible, it is helpful to add organic matter. Drainage is not needed. This soil is in capability unit 1 (I-1).

DOWLING SERIES

The poorly drained to very poorly drained Dowling soils are slightly to strongly acid. The very dark gray to light brownish-gray surface soil is underlain by a very plastic subsoil of dark-gray clay that is faintly to distinctly mottled. These soils were formed partly from alluvium washed in by the Mississippi River and deposited in slack-water areas, and partly from alluvium washed down from surrounding soils. They occur in depressions in the flood plain of the Mississippi River. Because of their very poor drainage and low position, these soils are flooded after heavy rains.

Dowling clay (0 to 1 percent slopes) (Db).—This poorly drained to very poorly drained, very plastic soil occurs in depressions. It was derived mainly from dark-colored, fine-textured alluvium washed in by the Mississippi River. Runoff and internal drainage are very slow. Most areas of this soil are slightly acid to medium acid.

This soil is associated with the Alligator and Sharkey soils. It differs from the Alligator clays in being more massive and darker colored in the layer directly under the surface soil. From the Sharkey clays, it differs in having a lighter colored lower subsoil.

Modal profile from a moist cultivated field (SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 10, T. 23 N., R. 3 W.):

- 0 to 4 inches, very dark gray (10YR 3/1) clay; very plastic, very firm, and very hard; slightly acid; granular structure.
- 4 to 17 inches, dark-gray (10YR 4/1) clay faintly mottled with gray, brown, and yellow; very plastic, very firm, and hard;

massive when wet; weak subangular blocky structure when dry; slightly acid; layer looks bluish gray at first glance; ranges from 7 to 16 inches in thickness.
17 to 40 inches +, gray (10YR 5/1 to 6/1) clay distinctly mottled with yellowish brown, dark yellowish brown, and very dark brown (10YR 5/8, 4/4, 2/2); very plastic; massive.

Included with this soil are a few areas that have a silty clay surface soil.

Use suitability.—This soil is difficult to cultivate and produces uncertain yields because it has a clay surface layer, has poor drainage, and occurs in low positions. The soil is in depressions that are a part of the natural drainage pattern and normally can be used to advantage as a location for secondary and primary drainage ditches. This soil is in capability unit 16 (IVw-1).

Dowling soils, overwash phases (Dc).—These poorly drained to very poorly drained soils occur in depressions. They were derived partly from alluvium washed in by the Mississippi River and partly from alluvium washed in from nearby silty and sandy soils. The surface layers range from silt loam to clay and are dark gray to light brownish gray. They are underlain by dark gray to very dark gray plastic clay. These soils are similar to Dowling clay, but they have a coarser surface layer. They are associated with coarser textured Forestdale, Dundee, and Dubbs soils.

Use suitability.—These very fertile soils are difficult to cultivate and produce uncertain yields because they have poor drainage and are in low positions. They occur in low depressions that are a part of the natural drainage pattern and can be used to advantage as a location for secondary and primary drainage ditches. They are in capability unit 15 (IIIw-13).

DUBBS SERIES

The Dubbs series consists of moderately well drained to well drained, deep, productive soils. They are moderately permeable and slightly acid to medium acid. The very friable, grayish-brown to pale-brown surface layer is underlain by a brown to yellowish-brown subsoil. The faintly mottled to mottle-free subsoil has a moderate subangular to angular blocky structure.

Dubbs soils are on old natural levees. They are more poorly drained than the Bosket soils and are better drained than the Dundee and Forestdale soils, with which they occur. Most areas of the Dubbs soils are nearly level and are along stream channels. They are at slightly higher elevations than the Dundee soils, are browner and slightly coarser, and have a profile almost free of mottles. The subsoil of the Dubbs soils is slightly finer than that of the Bosket soils and, as before mentioned, may show some mottling.

Dubbs silt loam, nearly level phase ($\frac{1}{2}$ to 3 percent slopes) (Dd).—This is a moderately well drained to well drained, deep, productive soil. It normally occurs in small areas on old natural levees and is slightly acid or medium acid. It was derived from stratified medium- to coarse-textured alluvium that was washed in by the Mississippi River.

This moderately permeable soil has more distinct profile development than the associated Bosket, Dundee, and Forestdale soils. It is better drained than the Dundee and Forestdale soils, but it is not so well drained as the Bosket soils. This soil is similar to Dubbs very fine sandy loam, nearly level phase, except that it has a finer

textured surface layer and a thicker and less sandy sub-surface layer.

Modal profile from a cultivated field (N $\frac{1}{2}$ SW $\frac{1}{4}$ sec. 4, T. 17 N., R. 4 W.):

- 0 to 7 inches, pale-brown (10YR 6/3, dry) silt loam; very friable; medium acid.
- 7 to 20 inches, brown (10YR 5/3, moist) silty clay loam; moderately plastic, firm, moderately hard; well-developed medium subangular and angular blocky structure; medium acid; layer may range from light yellowish brown to dark brown.
- 20 to 42 inches +, brown to yellowish-brown (10YR 5/3 to 10YR 5/4, moist) silt loam to very fine sandy loam slightly mottled with gray, yellow, and brown; very friable; weak subangular blocky to massive structure; medium acid; may be stratified with sandy loam.

The 7- to 20-inch layer ranges from silty clay to clay loam in texture.

Use suitability.—This is one of the best soils in the county because it is fertile, is easy to till, and has very good soil moisture and aeration. It is planted mostly to cotton. Nitrogen fertilizer and organic matter will increase fertility to give highest yields of cotton, corn, oats, and market vegetables. This soil is in capability unit 1 (I-1).

Dubbs silt loam, gently sloping phase (3 to 7 percent slopes) (De).—This moderately well drained to well drained soil normally has a grayish-brown to light grayish-brown very friable silt loam surface layer. The subsoil is a faintly mottled brown silty clay loam with well-developed medium subangular and angular blocky structure. This soil is similar to Dubbs silt loam, nearly level phase, except that it occurs in narrow, fairly short bands on stronger and more varied slopes, has faster surface runoff, has a slightly thinner surface layer, and is slightly more eroded. Most areas of this soil include some moderately eroded patches.

Use suitability.—This soil is used for the same crops as the other Dubbs soils. Nitrogen fertilizer and organic matter will increase yields of cotton, corn, oats, and market vegetables. This soil is easy to till throughout a wide range of moisture content. If the soil is used for row crops, contour tillage is needed to control erosion and to conserve moisture and fertility. This soil is in capability unit 3 (IIe-1).

Dubbs very fine sandy loam, nearly level phase ($\frac{1}{2}$ to 3 percent slopes) (Dg).—This moderately well drained to well drained, deep, productive soil is slightly acid to medium acid. It was derived from stratified, medium- to coarse-textured alluvium washed in by the Mississippi River. It is associated with Bosket and Dundee soils and occurs throughout the county on old natural levees.

This soil differs from Dubbs silt loam, nearly level phase, because it has a coarser and normally thinner and sandier surface layer. It is more sandy and less mottled than Dundee very fine sandy loam. It differs from Bosket very fine sandy loam in being finer textured and, in places, faintly mottled in the layer directly under the surface soil.

Modal profile from a moist cultivated field (NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 33, T. 23 N., R. 3 W.):

- 0 to 7 inches, pale-brown (10YR 6/3) very fine sandy loam; very friable; medium acid.
- 7 to 20 inches, brown (10YR 5/3) silty clay loam; moderately plastic, firm, moderately hard; well-developed medium subangular and angular blocky structure; medium acid; color of layer ranges from light yellowish brown to dark brown, and faint mottlings are present in places.

20 to 42 inches +, brown to yellowish-brown (10YR 5/3 to 5/4) silt loam or very fine sandy loam slightly mottled with yellow, brown, and gray; very friable; weak subangular blocky to massive structure; medium acid; layer may be stratified with sandy loam.

In places this soil has a loam texture. The texture of the 7- to 20-inch layer ranges from silty clay to clay loam.

Use and suitability.—Most of this soil has been cleared and is used mainly for cotton (fig. 8). The native vegetation was deciduous hardwoods and a heavy undergrowth

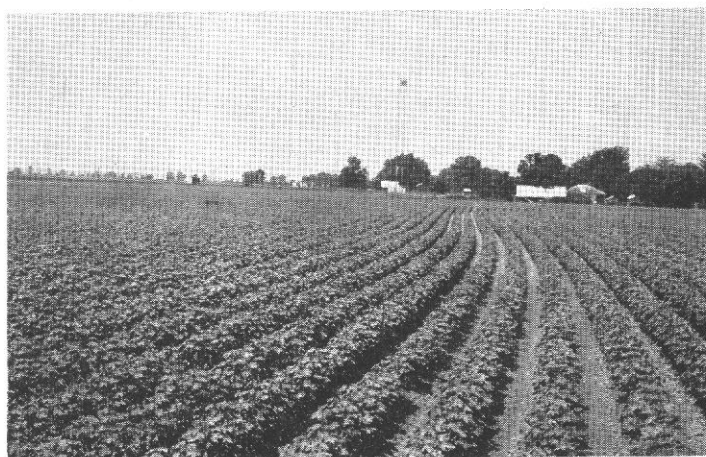


Figure 8.—Cotton on Dubbs very fine sandy loam; crop is planted in rows on the contour to control erosion and to conserve moisture and fertility.

of brush, cane, briars, and vines. Nitrogen fertilizer and organic matter will increase yields of cotton, corn, oats, and market vegetables. This is one of the best soils in the county because it is easy to till and has good moisture and aeration. It is in capability unit 1 (I-1).

Dubbs very fine sandy loam, gently sloping phase (3 to 7 percent slopes) (Dh).—This is a moderately well drained to well drained soil. It normally has a grayish-brown to pale-brown, very friable very fine sandy loam surface soil. The subsoil is a faintly mottled, brown, friable silty clay loam with a well-developed medium subangular and angular blocky structure. It is similar to Dubbs very fine sandy loam, nearly level phase, except that it occurs in narrow, fairly short bands on stronger and more varied slopes; has more rapid surface runoff; has a slightly thinner surface layer; and is slightly more eroded. Most mapping units include some moderately eroded spots.

Small patches of Dubbs silt loams and Dundee very fine sandy loams are included in some areas.

Use and suitability.—Nitrogen fertilizer and organic matter will increase yields of cotton, small grains, and corn. Row crops should be tilled on the contour to conserve moisture and fertility and to control erosion. The soil is easy to till throughout a wide range of moisture content. It is in capability unit 3 (IIe-1).

DUNDEE SERIES

The Dundee series consists of somewhat poorly drained to moderately well drained, deep, productive soils. They have formed from stratified alluvium of fine to coarse texture that was washed in by the Mississippi River. They are moderately fertile, somewhat slowly permeable,

and slightly to strongly acid. Normally they have a fairly well developed subsoil.

Dundee soils occur on the old natural levees, mostly in nearly level areas. In elevation on the old levees they are between the Dubbs and the Forestdale soils. Dubbs soils are nearest the stream channels, just beyond them are these Dundee soils, and farthest from the streams on the lowest elevations are the Forestdale soils.

Dundee soils have a more mottled and normally slightly finer textured subsoil than the Dubbs soils. They have browner, and less mottled subsoils and normally occur at slightly higher elevations than the Forestdale soils.

Dundee silt loam, nearly level phase ($\frac{1}{2}$ to 3 percent slopes) (Dk).—This is a somewhat poorly drained to moderately well drained, deep, slightly to strongly acid soil. It was derived from stratified beds of fine- to coarse-textured alluvium. It occurs throughout the county on old natural levees that were formed by the Mississippi River. The soil is associated with the Forestdale and Dubbs soils and with other Dundee soils.

This soil differs from the Forestdale silt loams, which are grayer and have a more mottled subsoil that contains a smaller amount of sand. It differs from the Dubbs silt loams that have a faintly mottled to mottle-free profile.

Modal profile from a moist cultivated field (SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 24, T. 17 N., R. 4 W.):

- 0 to 6 inches, grayish-brown (10YR 5/2) silt loam, moderately low in organic content; friable; medium acid.
- 6 to 24 inches, grayish-brown to brown (10YR 5/2 to 5/3) silty clay or silty clay loam faintly to distinctly mottled with gray, yellowish brown, and dark brown (10YR 5/1, 5/4, 4/3); moderately plastic, firm, hard; strongly acid; medium subangular to angular blocky structure.
- 24 to 36 inches +, grayish-brown (10YR 5/2) silty clay loam faintly to distinctly mottled with yellow, gray, and brown; in places is stratified with coarse-textured material; medium or strongly acid; weak subangular blocky to massive structure.

This soil is medium in fertility and moderately slowly permeable; typically it has a moderately well developed subsoil.

Small areas of Dundee very fine sandy loam and Forestdale silt loam were included in some areas of this soil.

Use suitability.—Nitrogen fertilizer and organic matter will increase yields of cotton, corn, small grains, and market vegetables. Because of its fairly high position on old natural levees, this soil needs little or no artificial drainage. Cotton is the chief crop. Small grains, corn, soybeans, hay, and pasture are grown to some extent. This soil is in capability unit 1 (I-1).

Dundee silt loam, gently sloping phase (3 to 7 percent slopes) (Dm).—This fairly slowly permeable soil occurs on old natural levees that were derived from fine- to coarse-textured Mississippi alluvium. It is similar to Dundee silt loam, nearly level phase, except that it occurs in narrow bands on stronger and more varied slopes, has faster surface runoff, is more eroded, and normally has thinner profile layers.

The surface soil, normally a grayish-brown silt loam, is underlain by a grayish-brown to brown silty clay or silty clay loam subsoil. This moderately developed subsoil is fairly plastic and has faint to distinct mottles.

Small areas of Dubbs silt loams, Dundee silty clay loams, and Forestdale silt loams were included with this soil. Many areas include moderately eroded patches.

Use suitability.—This soil is normally planted to the

same crops as the surrounding nearly level soils. Nitrogen fertilizer and organic matter should be added for best yields of cotton, corn, oats, and market vegetables. For row crops, this soil should be tilled on the contour to conserve moisture and fertility and to control erosion. This soil is in capability unit 3 (IIe-1).

Dundee silt loam, sloping phase (7 to 10 percent slopes) (Dn).—The few areas of this fairly slowly permeable, acid soil occur on some of the stronger slopes in the county. The parent material is fine- to coarse-textured alluvium washed in by the Mississippi River. The surface soil, normally a grayish-brown silt loam, is underlain by a grayish-brown to brown silty clay or silty clay loam subsoil that has well-developed medium subangular to angular blocky structure. The moderately plastic subsoil is faintly to distinctly mottled.

This soil resembles Dundee silt loam, gently sloping phase, in most profile characteristics, but it has stronger slopes and is normally more eroded. Small areas of Forestdale silt loams, Dubbs silt loams, and Dundee silty clay loams were included in some areas of this soil.

Use suitability.—To control erosion, cleared areas should be planted to permanent cover. This soil is in capability unit 17 (IVe-1).

Dundee silty clay loam, nearly level phase ($\frac{1}{2}$ to 3 percent slopes) (Do).—This somewhat poorly drained to moderately well drained soil is slightly acid to strongly acid. It normally occurs in small, widely scattered areas on the old natural levees. The parent material is alluvium of fine to medium texture that was washed in by the Mississippi River. This soil resembles Dundee silt loam, nearly level phase, in most profile characteristics, but its surface layer is normally thinner and finer textured, its subsoil is normally thicker, and its profile is less sandy throughout.

Modal profile from a moist cultivated field (NW corner sec. 17, T. 20 N., R. 3W.):

- 0 to 5 inches, grayish-brown (10YR 5/2) silty clay loam; friable; medium acid.
- 5 to 27 inches, grayish-brown (10YR 5/2) silty clay faintly to distinctly mottled with brown, yellow, or gray; plastic, firm, hard; medium subangular blocky structure; strongly acid.
- 27 to 42 inches +, light brownish-gray to grayish-brown (10YR 6/2 to 5/2) silty clay loam mottled with gray and yellowish brown; moderately plastic, firm, hard; weak subangular blocky to massive structure; medium to strongly acid; in places layer grades to sandier material.

Small patches of Dundee silty clays and Forestdale silty clay loams were included in some areas of this soil.

Use suitability.—Most of this soil has been cleared of its luxuriant growth of hardwoods, brush, vines, briars, and canes. It is now used chiefly for cotton, but small grains, corn, soybeans, annual hay, and pasture are also grown. The periods of cultivation and suitability for tillage are somewhat more limited than on the better drained, coarser soils. The soil should not be tilled when wet. Very little artificial drainage is needed, however. Nitrogen fertilizer and organic matter should be added for best yields of cotton, corn, oats, and market vegetables. This soil is in capability unit 9 (IIs-6).

Dundee silty clay loam, gently sloping phase (3 to 7 percent slopes) (Dp).—This somewhat poorly drained to moderately well drained soil occurs on old natural levees. The small areas are widely scattered throughout the tracts occupied by Dundee soils. This soil was derived from alluvium of fine to medium texture that was washed in

by the Mississippi River. It is similar to Dundee silty clay loam, nearly level phase, in most profile characteristics, but it occurs in narrow bands on stronger and more varied slopes, has medium surface runoff, has thinner profile layers, and is more eroded. Some areas have lost more than 25 percent of the original surface layer.

In cultivated fields, the surface soil, a grayish-brown silty clay loam, is underlain by grayish-brown silty clay of medium subangular blocky structure. This plastic subsoil is faintly to distinctly mottled. Some areas include small patches of Forestdale silty clay loams.

Use suitability.—This soil is normally planted to the same crops as the surrounding nearly level soils. Nitrogen fertilizer and organic matter should be added for best yields of cotton, corn, oats, and market vegetables. For row crops, this soil should be tilled on the contour to conserve moisture and fertility and to control erosion. This soil is in capability unit 4 (IIe-4).

Dundee silty clay loam, sloping phase (7 to 10 percent slopes) (Dr).—The few areas of this soil occur on some of the strongest slopes in the county. The soil is associated with other Dundee soils. It is similar to Dundee silty clay loam, gently sloping phase, in most profile characteristics, but it is more eroded and occurs on stronger slopes. The surface soil, normally a grayish-brown silty clay loam, is underlain by grayish-brown silty clay of medium subangular blocky structure. This plastic subsoil is faintly to distinctly mottled. Some areas include small areas of Dundee silt loams and Forestdale silty clay loams.

Use suitability.—To control erosion, any cleared areas should be planted to permanent cover. This soil is in capability unit 18 (IVe-2).

Dundee very fine sandy loam, nearly level phase ($\frac{1}{2}$ to 3 percent slopes) (Ds).—This somewhat poorly drained to moderately well drained deep soil is slightly to strongly acid. It occurs on small to fairly large areas on old natural levees and is associated with Dubbs and Forestdale soils and with other Dundee soils. It was derived from alluvium of fine to coarse texture that was washed in by the Mississippi River.

This soil is similar to Dundee silt loam, nearly level phase, in most profile characteristics, but it has a coarser and slightly thicker surface layer and normally has a slightly sandier subsoil. The subsoil has poorer drainage and is more mottled than that of the Dubbs very fine sandy loams, but it is browner, better drained and less mottled than that of the Forestdale very fine sandy loams.

Modal profile from a cultivated field (N $\frac{1}{2}$ sec. 34, T. 24 N., R. 3 W.):

- 0 to 6 inches, pale-brown (10YR 6/3, dry) very fine sandy loam; very friable; medium acid.
- 6 to 24 inches, grayish-brown to brown (10YR 5/2 to 5/3, moist) silty clay or silty clay loam with a noticeable content of sand; faintly to distinctly mottled with gray, yellowish brown, and dark brown (10YR 5/1, 5/4, 4/3, moist); moderately plastic, firm, hard; moderately developed medium subangular and angular blocky structure; medium acid; layer may range in texture to include sandy clay, and in color, to include dark brown and yellowish brown.
- 24 to 36 inches, grayish-brown silty clay loam faintly to distinctly mottled with gray and brown; friable; weak subangular blocky to massive structure; medium acid; layer may be stratified with sandier material.

Some areas that have a loam surface layer were included with this soil, and some small areas with a silt loam surface layer were also included.

Use suitability.—This soil is planted chiefly to cotton, but it is excellent for most row crops grown in the area. Nitrogen fertilizer and organic matter must be added for best yields of cotton, corn, oats, and market vegetables. Oats for grain and for winter grazing do well on this soil, and soybeans grow well when moisture is plentiful. Little, if any, artificial drainage is necessary. Like the Dubbs soils, this soil is desirable for homesites, gardens, and orchards. Its texture and tilth make farm operations possible at any season. To maintain high yields, rotate soil-improving crops with other crops and apply nitrogen fertilizer. This soil is in capability unit 1 (I-1).

Dundee very fine sandy loam, gently sloping phase (3 to 7 percent slopes) (Dt).—This fairly slowly permeable soil is scattered throughout areas of Dundee and Dubbs soils on old natural levees. The parent material is fine- to coarse-textured alluvium washed in by the Mississippi River. The very friable surface layer, a very fine sandy loam, ranges from pale brown, when dry, to grayish brown, when moist. It is underlain by a grayish-brown to brown silty clay or silty clay loam subsoil that is fairly plastic and moderately well developed. The subsoil is faintly to distinctly mottled.

This soil is similar to Dundee very fine sandy loam, nearly level phase, in most profile characteristics but occurs in narrow bands on stronger and more varied slopes, has a thinner surface layer, and is slightly more eroded. Some areas are moderately eroded.

Use suitability.—This soil is normally planted to the same crops as the surrounding soils. Nitrogen fertilizer and organic matter are needed for best yields of cotton, corn, oats, and market vegetables. Row crops should be tilled on the contour to conserve moisture and fertility and to control erosion. This soil is in capability unit 3 (IIe-1).

Dundee very fine sandy loam, sloping phase (7 to 10 percent slopes) (Du).—The few areas of this fairly slowly permeable soil occur on some of the strongest slopes of the county. The parent material is fine- to coarse-textured alluvium washed in by the Mississippi River. The surface layer, normally a grayish-brown very fine sandy loam, is underlain by a grayish-brown to brown silty clay or silty clay loam subsoil that has well-developed medium subangular to angular blocky structure. The subsoil is moderately plastic and is faintly to distinctly mottled.

This soil is similar to Dundee silt loam, sloping phase, in most profile characteristics but has a slightly coarser surface layer. It occurs on stronger slopes than Dundee very fine sandy loam, gently sloping phase, so it has faster surface runoff and is slightly more eroded where cultivated.

Included with this soil are small areas of Dundee silt loams, Dubbs very fine sandy loams, and Forestdale very fine sandy loams.

Use suitability.—Cleared areas of this soil should be reseeded to permanent cover to control erosion. This soil is in capability unit 17 (IVe-1).

Dundee-Clack soils, nearly level phases ($\frac{1}{2}$ to 3 percent slopes) (Dv).—This unit is made up of the nearly level phases of Dundee, Dubbs, Bosket, Beulah, and Clack soils, or any combination of these soils. The soil pattern is not uniform and often changes within a few feet. These soils occur normally in fairly small areas along, or near, the Sunflower River, or along channels of former large streams.

The light brownish-gray to grayish-brown surface layers are silty clay loam to sandy loam, 5 to 8 inches thick. The

subsoils may be those of any of the soils listed above. They range from silty clays to loamy sands, from distinctly mottled to mottle free, and from moderately well drained to excessively drained.

Use suitability.—These soils are fairly good for crops, although a few spots are droughty. They are used mostly for cotton, oats, and pasture. Oats normally provide excellent grazing for winter. Nitrogen fertilizer and organic matter should be added for best yields of cotton, corn, oats, and market vegetables. Normally, no artificial drainage is needed. These soils are in capability unit 5 (IIs-1).

Dundee-Clack soils, gently sloping phases (3 to 7 percent slopes) (Dw).—This unit is made up of Dundee, Dubbs, Bosket, Beulah, and Clack soils, or any combination of these soils. It occurs on stronger slopes than the nearly level phases; it is more eroded and has more varied slopes. Drainage is moderate to excessive. The soil pattern is not uniform, and in places it changes within a few feet.

The light brownish-gray to grayish-brown surface layers range from a silty clay loam to a sandy loam in texture and from 5 to 8 inches in thickness. The subsoils are brown silty clay to loamy sand that may have distinct mottling to no mottling. Most areas include some moderately eroded places and a few places that have stronger slopes.

Use suitability.—In many places contour tillage is not possible because the slopes are so irregular. Oats are grown for grain and for winter grazing. Much of the acreage is in pasture. These soils are in capability unit 5 (IIs-1).

FORESTDALE SERIES

The Forestdale series consists of light brownish-gray to grayish-brown soils that are poorly drained to somewhat poorly drained and are slightly to very strongly acid. They occur on old natural levees and have developed from stratified alluvium of medium to fine texture that was washed in by the Mississippi River. They have poorer drainage than the Beulah, Dubbs, Dundee, and Bosket soils. Compared with the Dundee, the Forestdale soils have poorer drainage, normally occur at lower elevations on the old natural levees, have a grayer profile with more mottling, and are slightly less productive.

Forestdale silt loam, level phase (0 to $\frac{1}{2}$ percent slopes) (Fa).—This is a poorly drained soil with slow surface runoff. In profile characteristics it is similar to Forestdale silt loam, nearly level phase, but it occurs in nearly level areas so that it has slower surface runoff and stays wet longer.

The light-colored, friable silt loam surface layer is underlain by a fine-textured layer. The fine-textured layer, normally 18 to 22 inches thick, is a plastic, highly mottled, light brownish-gray silty clay of medium subangular to angular blocky structure. Some areas contain spots that have a silty clay loam surface layer.

Use suitability.—This soil should be drained because slow surface runoff and poor drainage prevent most plant roots from penetrating the soil readily. All crops common to the area are grown, but cotton yields are uncertain in wet seasons unless the soil has been drained. Nitrogen fertilizer should be added for best crop yields. This soil is in capability unit 12 (IIIw-3).

Forestdale silt loam, nearly level phase ($\frac{1}{2}$ to 3 percent

slopes) (Fb).—This poorly drained to somewhat poorly drained soil is slightly acid to very strongly acid. Its parent material is alluvium of fine to medium texture that was washed in by the Mississippi River.

The surface layer is a friable silt loam, low in organic matter and somewhat low in fertility, that frequently forms a hard crust after rains. Small concretions of manganese and iron are common in the surface soil and upper subsoil. Plant roots do not readily penetrate the fine-textured upper subsoil, and the crust on the surface soil may prevent getting a good stand.

This gray soil that has distinct to prominent mottling in the subsoil is associated with Dundee silt loam, which is brown with faint to distinct mottling. Also, the Dundee silt loam normally has a more developed structure and a sandier subsoil that is more friable and better drained.

Included with this Forestdale soil are areas that have a silty clay loam or very fine sandy loam surface layer.

Modal profile from a moist cultivated area (SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 32, T. 24 N., R. 3 W.):

- 0 to 6 inches, light brownish-gray (10YR 6/2) silt loam; friable; medium acid.
- 6 to 24 inches, light brownish-gray (10YR 6/2) silty clay distinctly mottled with gray, brown, and yellow; plastic, firm, very hard; moderately developed medium subangular to angular blocky structure; strongly acid; color of layer ranges from gray to grayish brown.
- 24 to 36 inches +, gray (10YR 6/1) to light brownish-gray (10YR 6/2) silty clay loam mottled with brown, yellow, and gray; firm to friable; weak subangular blocky to massive structure; medium to strongly acid; layer may be stratified with sandier material.

Some areas of this soil include spots of Dundee silt loam.

Use suitability.—Most of this soil has been cleared of the native hardwoods, underbrush, vines, cane, and briars. It is now used for cotton, soybeans, oats, corn, and pasture. This soil should be drained and, if feasible, nitrogen fertilizer and organic matter should be added to get best crop yields. The slow surface runoff can be improved by digging shallow ditches. This soil is in capability unit 7 (IIs-3).

Forestdale silt loam, gently sloping phase (3 to 7 percent slopes) (Fc).—This is a poorly drained to somewhat poorly drained soil that is scattered throughout the areas of Forestdale silt loams and Dundee silt loams. The surface layer, normally a friable, light brownish-gray silt loam, is underlain by a highly mottled, gray to light brownish-gray, stratified subsoil of fine to medium texture.

This soil is similar to Forestdale silt loam, nearly level phase, in most profile characteristics; but it occurs on stronger and more varied slopes in narrow but fairly long bands along former stream channels, has faster surface runoff, is more eroded, has profile layers that vary more in thickness, and normally has a thinner surface layer. Most areas of this soil have some moderately eroded places.

Included with the soil are small spots of Dundee silt loams and Forestdale silty clay loams.

Use suitability.—For control of erosion, Forestdale silt loam, gently sloping phase, should be planted to close-growing crops or tilled on the contour. Nitrogen fertilizer should be added for best yields of cotton, corn, oats, and market vegetables. Addition of organic matter improves this soil. It is in capability unit 7 (IIs-3).

Forestdale silt loam, sloping phase (7 to 10 percent slopes) (Fd).—The few areas of this soil occur in narrow

bands along stream channels or former stream channels. Its surface layer, normally a friable, light brownish-gray silt loam, is underlain by a highly mottled, gray to light brownish-gray, stratified subsoil of fine to medium texture. This soil is similar to Forestdale silt loam, gently sloping phase, in most profile characteristics but occurs on stronger and more varied slopes, normally has thinner layers, and is more eroded. All cultivated areas have some moderately eroded places. Included with this soil are small areas that have surface layers of silty clay loam.

Use suitability.—For control of erosion, cleared areas of this soil should be reseeded to permanent cover. This soil is in capability unit 17 (IVe-1).

Forestdale silty clay, level phase (0 to $\frac{1}{2}$ percent slopes) (Fe).—The few areas of this soil have very slow surface runoff and slow internal drainage. The surface layer, normally a plastic, grayish-brown silty clay, is underlain by a highly mottled, gray to grayish-brown, stratified subsoil of fine to medium texture. This soil is similar to Forestdale silty clay, nearly level phase, in most profile characteristics but occurs in more nearly level places. Large cracks that damage the roots of many crops develop during long dry periods. Included are a few areas that have a surface layer of clay.

Use suitability.—The poor drainage, nearly level relief, and plastic surface layer of this soil make crop yields uncertain. Rice, hay, and pasture would probably be better suited than cotton or corn. This soil is in capability unit 14 (IIIw-11).

Forestdale silty clay, nearly level phase ($\frac{1}{2}$ to 3 percent slopes) (Fg).—This is a poorly drained to somewhat poorly drained, slightly acid to very strongly acid soil. It developed from stratified fine- to medium-textured alluvium washed in by the Mississippi River. It occurs in fairly small areas scattered throughout tracts occupied by Forestdale and Alligator soils. It is associated with other mapping units of Forestdale silty clay loam and with Alligator silty clay.

The subsurface layer of this soil is a silty clay, less than 30 inches deep, that is stratified with silty clay loam. It is sandier, is not so deep, and has more of the brownish mottlings than the corresponding layer of Alligator silty clay, nearly level phase.

Modal profile from a moist cultivated field (SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 32, T. 19 N., R. 3 W.):

- 0 to 3 inches, grayish-brown (10YR 5/2) silty clay; plastic; strongly acid.
- 3 to 26 inches, grayish-brown and gray (10YR 5/2 and 5/1) silty clay prominently mottled with yellowish brown and dark yellowish brown (10YR 5/8 and 4/4); plastic, firm, very hard; moderately developed medium subangular blocky structure; strongly acid.
- 26 to 42 inches, gray (10YR 6/1 to 5/1) silty clay loam prominently mottled with yellowish brown and gray; firm to friable; weak subangular blocky to massive structure; medium acid.

In places this Forestdale soil includes small areas that have a clay surface layer.

Use suitability.—Like Alligator clay, nearly level phase, this soil can be tilled easily for only a short period, as it is too sticky and plastic when wet and too hard when dry. Large cracks that develop during long dry periods damage the roots of crops. During cultivation part of the loose surface soil may fall into the cracks.

When first cleared, this soil has a fairly large amount of organic matter, but this decreases rather rapidly.

Drainage is a problem. Nitrogen fertilizer must be added for best yields of most crops. Organic matter should be added, if feasible. All common crops are grown, but rice, hay, soybeans, and pasture probably are best. This soil is in capability unit 11 (IIIs-4).

Forestdale silty clay, gently sloping phase (3 to 7 percent slopes) (Fh).—This soil is widely scattered throughout the tracts occupied by Forestdale soils. It normally has a grayish-brown, plastic silty clay surface layer that is underlain by a gray to grayish-brown subsoil. The highly mottled subsoil is made up of thin layers of fine to medium texture. This soil is similar to Forestdale silty clay, nearly level phase, in most profile characteristics, but it occurs in narrow bands on stronger and more varied slopes and is more likely to be eroded. Most areas of this soil include some moderately eroded places.

Use suitability.—The scattered areas of this soil are planted to the same crops as the surrounding soils. Contour tillage and planting close-growing crops help to control erosion. This soil is in capability unit 11 (IIIs-4).

Forestdale silty clay loam, level phase (0 to $\frac{1}{2}$ percent slopes) (Fk).—The few areas of this poorly drained to somewhat poorly drained soil developed from stratified alluvium of fine to medium texture that was washed in by the Mississippi River. The surface layer, normally a grayish-brown silty clay loam, is underlain by a highly mottled, light brownish-gray to gray subsoil made up of layers of silty clay and silty clay loam or sandy clay loam. This soil is similar to Forestdale silty clay loam, nearly level phase, in most profile characteristics but occurs in level places, and therefore it has slower surface runoff and remains wet longer.

Use suitability.—Drainage is needed to remove surface water if row crops are grown. Rice, hay, pasture, and possibly soybeans would be better suited than row crops because there is less danger of their being damaged by floods. If soil-improving crops are grown frequently, the tilth and fertility of this soil improve. This soil is in capability unit 13 (IIIw-5).

Forestdale silty clay loam, nearly level phase ($\frac{1}{2}$ to 3 percent slopes) (Fm).—This poorly drained to somewhat poorly drained soil is slightly acid to very strongly acid. The small to large areas are widely scattered over the county. In many places this soil lies above low areas that are sometimes flooded, as the slack-water areas of Alligator clays, and below areas on the old natural levees, as the areas of Dundee and Forestdale silt loam. Or it may occur at the highest elevations in a generally low area; for example, on the old natural levees in tracts that are dominantly slack-water clays.

This soil is closely associated with Alligator silty clay loams, Forestdale silt loams, and Dundee silty clay loams. It is grayer than the Dundee silty clay loams, has poorer drainage, and is more mottled in the subsurface layer. It is similar to the Forestdale silt loams in most profile characteristics, but it is not so easy to till, has a slightly thinner, darker, and finer textured surface layer, and normally has a thicker subsurface layer. The subsurface layer of this soil is not so deep as the corresponding layer in the Alligator silty clay loams, and it is more sandy and more mottled. The subsurface layer of the Alligator silty clay loams normally is clay, more than 30 inches deep.

Modal profile from a moist cultivated area (NE¼ sec. 5, T. 23 N., R. 3 W.):

0 to 4 inches, grayish-brown (10YR 5/2) silty clay loam; medium to strongly acid.

4 to 26 inches, gray to light brownish-gray (10YR 5/1 to 6/2) plastic silty clay prominently mottled with yellowish brown and brownish yellow (10YR 5/6 and 6/8); plastic, firm, very hard; well-developed medium subangular blocky structure; strongly acid.

26 to 36 inches +, gray (10YR 6/1 to 5/1) silty clay loam highly mottled with gray, yellow, and brown; moderately plastic, firm, hard; firm to friable; weak subangular blocky to massive structure; medium to strongly acid.

The texture of the subsurface layer is mainly silty clay, but there may be strata of silty clay loam or sandy clay loam in the layer.

Use suitability.—Most of this soil has been cleared of the native hardwoods, bushes, cane, vines, and briars and is now used for all the common crops. Nitrogen fertilizer should be added for best yields of cotton, corn, oats, and market vegetables. Drainage is normally needed, and organic matter should be added, if feasible. The silty clay subsoil holds irrigation water well, so rice can be grown. This soil is in capability unit 8 (II_s-4).

Forestdale silty clay loam, gently sloping phase (3 to 7 percent slopes) (Fn).—Fairly long, narrow bands of this soil are scattered throughout larger areas of Dundee soils and areas of other Forestdale soils. The soil is similar to the nearly level phase of Forestdale silty clay loam in most profile characteristics but occurs on stronger and more varied slopes, has faster surface runoff, normally has more variable layers in its profile, generally has a thinner surface layer, and is slightly more eroded. Most areas include a few moderately eroded places.

This soil normally has a grayish-brown silty clay loam surface layer underlain by a gray, light brownish-gray, or grayish-brown subsoil. The highly mottled subsoil is made up of layers of silty clay and silty clay loam or sandy clay loam.

Included with this soil are spots of Alligator silty clay loams, Forestdale silty clays, and Dundee silty clay loams.

Use suitability.—This soil is planted to the same crops as the surrounding soils. Nitrogen fertilizer and organic matter should be added for best yields of cotton, corn, oats, and market vegetables. Contour tillage or planting of permanent cover crops is needed to help control erosion (fig. 9). This soil is in capability unit 8 (II_s-4).

Forestdale silty clay loam, sloping phase (7 to 10 percent slopes) (Fo).—The few areas of this soil occur in narrow bands along stream channels or former stream channels. This soil is similar to Forestdale silty clay loam, gently sloping phase, in most profile characteristics but occurs on stronger and more varied slopes, normally has thinner profile layers, and is more eroded. Most areas include some moderately eroded spots.

The grayish-brown silty clay loam surface layer is underlain by a gray, light brownish-gray, or grayish-brown subsoil. The highly mottled subsoil is made up of layers of silty clay and silty clay loam or sandy clay loam.

Use suitability.—Cleared areas of this soil should be planted to permanent cover to control erosion. This soil is in capability unit 18 (IV_e-2).

Forestdale very fine sandy loam, level phase (0 to ½ percent slopes) (Fp).—In profile characteristics, this soil is similar to the nearly level phase of Forestdale very fine sandy loam. It occurs in more nearly level areas, how-



Figure 9.—Cotton right of road on level phases of Dubbs and Dundee soils; permanent pasture on gently sloping Forestdale and Dundee soils on left. Many field roads are located so as to separate soils used for different purposes.

ever, has slower surface runoff, and remains wet longer. The very friable surface layer, normally a light brownish-gray to grayish-brown very fine sandy loam, is underlain by a light brownish-gray silty clay layer. This highly mottled upper subsoil is normally 18 to 20 inches thick.

Use suitability.—Drainage is needed, and nitrogen fertilizer should be added for best yields on this soil. The small acreage of this soil ordinarily is planted to the same crops as the surrounding sandy soils. This soil is in capability unit 12 (III_w-3).

Forestdale very fine sandy loam, nearly level phase (½ to 3 percent slopes) (Fr).—This is a poorly drained to somewhat poorly drained, slightly to strongly acid soil. It is similar to Forestdale silt loam, nearly level phase, in most profile characteristics but has a coarser textured surface layer, and normally it has more sand throughout the profile. This soil has a grayer and more mottled subsoil than Dundee very fine sandy loam, nearly level phase. Associated with this soil are areas of Dundee very fine sandy loams and Forestdale silt loams.

Modal profile from a moist cultivated area (NW¼NE¼ sec. 10, T. 20 N., R. 3 W.):

0 to 6 inches, light brownish-gray to grayish-brown (10YR 6/2 to 5/2) very fine sandy loam; very friable; medium acid.

6 to 24 inches, light brownish-gray (10YR 6/2) silty clay highly mottled with gray and yellowish brown (10YR 6/1, 5/6, and 5/8); plastic, firm, very hard; moderately developed medium subangular blocky structure; strongly acid.

24 to 36 inches +, gray (10YR 6/1) silty clay loam distinctly mottled with light brownish gray and yellowish brown (10YR 6/2, 5/8); firm to friable; weak subangular blocky to massive structure; medium to strongly acid.

In places the surface soil is a loam. Included with this soil are a few spots of Dundee very fine sandy loam and Forestdale silt loam. A few areas of this soil are level.

Use suitability.—Organic matter and nitrogen fertilizer should be added and shallow ditches should be used in low areas for best yields of crops. The very fine sandy loam surface layer prevents extensive crusting, so yields are often better than on the Forestdale silt loams. Farmwork normally can be done on this soil most of the year. Use of this soil, however, is more limited than that of the very fine sandy loams of the Dundee, Dubbs, and Bosket series. Soil-improving crops should be included in the crop rota-

tions, and fertilizer should be added to maintain high productivity. This soil is in capability unit 7 (IIs-3).

Forestdale very fine sandy loam, gently sloping phase (3 to 7 percent slopes) (Fs).—The few areas of this soil occur on old natural levees. They are poorly drained to somewhat poorly drained. The parent material, stratified alluvium of fine to medium texture, was washed in by the Mississippi River. The very friable surface layer, normally a light brownish-gray very fine sandy loam, is underlain by a subsoil of stratified light brownish-gray to gray silty clay and silty clay loam. The subsoil is prominently mottled.

This soil is similar to Forestdale very fine sandy loam, nearly level phase, in most profile characteristics. Nevertheless, it occurs in narrow bands on stronger and more varied slopes and has more rapid surface runoff, adequate drainage, a slightly thinner surface layer, and a subsoil that varies more in thickness. Also, this soil is slightly more eroded. Most areas include some moderately eroded spots and areas with a silt loam surface layer.

Use suitability.—This soil is planted to almost the same crops as the nearly level phase of Forestdale very fine sandy loam. It should be tilled on the contour or kept in permanent cover to control erosion. This soil is in capability unit 7 (IIs-3).

IBERIA SERIES

The Iberia series, represented by one soil in the county, consists of poorly drained, slightly acid to alkaline, black to very dark gray, clayey soils. The soils were derived from fine, dark alluvium washed in by the Mississippi River. The native vegetation was of the cypress type. This series is associated with Alligator soils but is less acid, has a darker upper profile, occurs in level areas, and has much more organic matter in the profile.

Iberia clay (0 to 1 percent slopes) (1a).—This is a poorly drained, black to very dark gray, slightly acid to alkaline clay soil. It is very plastic and has more organic matter in the profile than any other soil in the county. Surface runoff is very slow, and internal drainage is slow to very slow. The soil occurs in level to nearly level areas in the western part of the county near the Washington County line, south of Highway 82. The parent material is dark, fine-textured alluvium washed in by the Mississippi River. The vegetation was of the cypress type.

This soil is associated with Alligator clays but has a darker upper profile, is less acid, and has more organic matter throughout the profile.

Modal profile from a moist cultivated area (SW¼NW¼ sec. 16, T. 18 N., R. 5 W.):

- 0 to 3 inches, black to very dark gray (10YR 2/1 to 3/1) clay; sticky and plastic when wet; strong medium granular structure; slightly acid.
- 3 to 10 inches, black to very dark gray (10YR 2/1 to 3/1) clay with no mottling; very plastic, very firm, very hard or extremely hard; massive when wet; weakly developed medium subangular blocky structure when dry; neutral.
- 10 to 35 inches, gray to dark-gray (5YR 5/1 to 4/1) clay faintly to distinctly mottled with dark brown and dark reddish brown; very plastic, very firm, very hard or extremely hard; massive when wet; very weakly developed subangular blocky structure when dry; slightly alkaline.
- 35 inches +, dark-gray to olive-gray (5Y 4/1 to 4/2) clay distinctly to prominently mottled with yellowish brown, strong brown, and olive brown; firm; massive; alkaline.

In each layer, down to more than 6 feet, there are pieces of decaying cypress. Mapped with this soil are a few small areas that have a silty clay loam surface layer.

Use suitability.—This soil has more organic matter than the associated Alligator clays; therefore it is more desirable because it is easier to till and produces higher yields. Extensive drainage is needed, however. In most years this soil produces fair to good crops of cotton, corn, oats, and soybeans. It is in capability unit 11 (IIIs-4).

PEARSON SERIES

The Pearson series consists of somewhat poorly drained to moderately well drained silty soils. The soils have a pale-brown silt loam surface layer underlain by a yellowish-brown to grayish-brown silty subsoil. These medium to strongly acid soils developed mostly from highly silty alluvium. They occur near Jones, Fox, Porter, and Indian Bayous on stream terraces where the drainage is intermediate between that of the well-drained Dexter soils and that of the poorly drained Brittain soils. The Pearson soils are better drained, occur on slightly higher elevations, and have browner profiles than the Brittain. They are also somewhat poorer drained and have more mottling in the subsurface layer than the Dexter soils. The Pearson soils in this county have a silt loam to silty clay loam subsurface layer rather than the silty clay subsurface layer typical of the Dundee soils.

Pearson silt loam, nearly level phase (½ to 3 percent slopes) (Pa).—This inextensive, somewhat poorly drained to moderately well drained soil is medium to strongly acid. It occurs at some of the higher elevations of the county on the old natural levees. It is associated with Brittain, Dexter, and Dundee silt loams in the western part of the county near Jones, Fox, Porter, and Indian Bayous. It has more silt and less clay in the upper subsoil than the Dundee silt loams. It is not so well drained as the Dexter silt loams. Its profile is faintly to distinctly mottled, whereas the Dexter is faintly mottled to mottle free. This Pearson soil has a better drained upper subsoil than the Brittain silt loam.

Modal profile from a moist cultivated area (SW¼ sec. 31, T. 20 N., R. 5 W.):

- 0 to 7 inches, pale-brown (10YR 6/3) mellow silt loam; medium acid.
- 7 to 17 inches, yellowish-brown (10YR 5/6) friable silt loam to silty clay loam faintly to distinctly mottled with gray, yellow, and brown; weak medium angular to subangular blocky structure; strongly acid; layer is grayish brown in some places.
- 17 to 29 inches, pale-brown (10YR 6/3) friable silty clay loam faintly to distinctly mottled with gray; moderate medium subangular to angular blocky structure; medium acid.
- 29 to 32 inches, grayish-brown (10YR 5/2) firm silty clay; massive layer may be at shallower or deeper depths, or may be lacking entirely.
- 32 inches +, brown (10YR 5/3) friable silty clay loam with prominent light-gray (10YR 7/2) mottling; texture is a silt loam in places; massive.

Many tracts of this soil include small areas of typical Dundee silt loams, as well as areas transitional to Dundee silt loams. Included with this soil are small areas having a very fine sandy loam surface layer.

Use suitability.—Nitrogen fertilizer and organic matter should be added for best yields of cotton, corn, oats, and market vegetables. Very little drainage is needed. This acreage is planted mostly to cotton, but soybeans, small grains, corn, pasture, and other crops are also grown. This soil is in capability unit 1 (I-1).

Pearson silt loam, gently sloping phase (3 to 7 percent slopes) (Pb).—The few areas of this soil have moderately

slow permeability. The parent material is mostly highly silty alluvium. The areas are on slopes near Jones, Porter, and Indian Bayous.

This soil is similar to Pearson silt loam, nearly level phase, in most profile characteristics but occurs on stronger and more varied slopes, has more rapid runoff, and has a thinner surface layer.

The normally pale-brown, friable silt loam surface layer is underlain by a subsoil of yellowish-brown to pale-brown silt loam or silty clay loam. This friable subsoil is faintly to distinctly mottled, and at depths of 30 inches or more, ordinarily has prominent light-gray mottling. Lenses, 2 to 3 inches thick, of grayish-brown silty clay often occur at various depths in the subsoil. Many areas of this soil include small moderately eroded spots.

Use suitability.—The areas of this soil are so small that they are normally planted to the same crops as the surrounding nearly level soils. Nitrogen fertilizer and organic matter should be added for best yields of cotton, corn, oats, and market vegetables. Row crops should be tilled on the contour to conserve moisture and fertility and to control erosion. This soil is in capability unit 3 (IIe-1).

SHARKEY SERIES

The Sharkey soils have a very dark grayish-brown, very plastic, poorly drained clayey surface soil underlain by a faintly to distinctly mottled, very dark gray to dark gray clay subsoil of weak subangular structure. These slightly to medium acid soils are slowly to very slowly permeable. They were formed from alluvium of fine texture that was washed in by the Mississippi River. They occur in slack-water areas and are locally called buckshot or gumbo land. These soils are associated with the Alligator and Dowling soils. The Sharkey soils are darker and normally slightly less acid than the Alligator soils. They do not occur in depressions as the Dowling soils do, and their profiles are dark throughout, rather than in the upper 20 inches as in the Dowling soils.

Sharkey clay, level phase (0 to $\frac{1}{2}$ percent slopes) (Sa).—This soil has very slow surface runoff and very slow internal drainage; it is very plastic and sticky throughout. Large cracks develop during long dry periods. The soil is slightly acid to medium acid. In cultivated areas the surface layer normally is very dark grayish-brown granular clay and the underlying layers are very dark gray to dark gray clay.

This soil is similar to Sharkey clay, nearly level phase, in most profile characteristics but occurs in more nearly level areas and remains wet longer. Many areas of the soil include spots that have a silty clay surface layer.

Use suitability.—This soil can be tilled easily for only short periods, as it is too plastic and sticky when wet and too hard when dry. Drainage is needed, and nitrogen fertilizer should be added for cotton, oats, and corn. Yields of these crops are uncertain, however. Rice, hay, and pasture probably are better suited. This soil is in capability unit 14 (IIIw-11).

Sharkey clay, nearly level phase ($\frac{1}{2}$ to 3 percent slopes) (Sb).—This is a dark, poorly drained, slightly acid to medium acid soil. Its parent material is fine-textured alluvium washed in by the Mississippi River. Locally it is called buckshot or gumbo land. Surface runoff is slow, and internal drainage is slow to very slow. This soil has

a darker profile than the Alligator clays. It differs from the associated Dowling clay in that it does not occur in depressions.

Modal profile from a moist cultivated area (W $\frac{1}{2}$ SE $\frac{1}{4}$ sec. 19, T. 24 N., R. 4 W.):

0 to 3 inches, very dark grayish-brown (10YR 3/2) granular clay; very plastic, very firm, very hard; slightly acid.

3 to 20 inches, very dark gray to dark gray (10YR 3/1 to 4/1) clay faintly mottled with gray and yellowish brown; very plastic, very firm, very hard or extremely hard; massive when wet, very weak subangular blocky structure when dry; medium acid.

20 to 42 inches +, dark-gray (10YR 4/1) clay; mottled; very plastic; massive; medium to slightly acid.

Mapped with this soil are many areas that have a silty clay surface layer.

Use suitability.—This soil can be tilled easily for only a short period, as it is too plastic and sticky when wet and too hard when dry. Deep, wide cracks form during long dry seasons.

Row crops grow better in ridged areas of this soil or in places near small bayous than in the large nearly level areas.

When first cleared, this soil has a fairly high content of organic matter, but this normally decreases rather rapidly. Drainage is needed, and nitrogen fertilizer will increase yields of cotton, corn, oats, and market vegetables. All common crops are grown; but rice, soybeans, hay, and pasture are probably best suited. This soil is in capability unit 11 (IIIs-4).

Sharkey clay, gently sloping phase (3 to 7 percent slopes) (Sc).—This poorly drained, very plastic soil was derived from dark, fine-textured alluvium washed in by the Mississippi River. It occurs in widely scattered, narrow bands throughout tracts occupied by the Sharkey soils. The clay surface layer, normally very dark grayish brown and granular, is underlain by a very dark gray to dark gray clay subsoil that greatly retards the downward movement of water. The very plastic subsoil is faintly to distinctly mottled. This soil is similar to Sharkey clay, nearly level phase, in most profile characteristics but occurs on stronger and more varied slopes. Mapped with this soil are many areas that have a silty clay surface layer.

Use suitability.—The small acreage of this soil is normally planted to the same crops as the surrounding nearly level land. Surface runoff on its gentle slopes can cause moderate erosion. Running rows across the slopes or planting close-growing crops will help to control erosion. This soil is in capability unit 11 (IIIs-4).

Sharkey clay, sloping phase (7 to 10 percent slopes) (Sd).—The few areas of this soil normally occur as narrow bands on slopes along former stream channels. The soil has a very dark grayish-brown, granular clay surface layer. The subsoil is a very dark gray to dark gray clay, very plastic, and faintly to distinctly mottled.

The soil is similar to Sharkey clay, gently sloping phase, in most profile characteristics, but it occurs on stronger and more varied slopes and has faster surface runoff. It is also slightly more eroded where clean-tilled crops are grown.

Use suitability.—Cleared areas should be planted to permanent cover to control erosion. This soil is in capability unit 18 (IVe-2).

Sharkey silty clay loam, level phase (0 to $\frac{1}{2}$ percent slopes) (Se).—The few small areas of this soil have a slowly permeable surface soil and a very plastic, mottled

subsoil. The dark grayish-brown silty clay loam surface layer is underlain by very dark gray to dark gray clay that greatly retards the downward movement of water, air, and plant roots. The soil is similar to Sharkey silty clay loam, nearly level phase, in most profile characteristics, but it is more nearly level, stays wet longer, and needs more thorough drainage.

Use suitability.—This soil needs thorough drainage, and nitrogen fertilizer should be added for best yields of cotton, corn, and most other cultivated crops. Like the level phase of Sharkey clay, this soil is best suited to rice, hay, pasture, and possibly soybeans. It is in capability unit 13 (IIIw-5).

Sharkey silty clay loam, nearly level phase ($\frac{1}{2}$ to 3 percent slopes) (Sg).—This poorly drained, medium to slightly acid soil occurs in slack-water areas on the flood plain. Its parent material was fine-textured alluvium washed in by the Mississippi River. The surface layer, normally a very dark grayish-brown to dark grayish-brown silty clay loam, is underlain by very dark gray to dark gray clay that greatly retards the downward movement of water. The very plastic subsoil is mottled.

This soil resembles Sharkey clay, nearly level phase, in most profile characteristics but has a coarser textured surface layer that makes tillage easier. This soil has a darker gray profile and is less mottled than Alligator silty clay loam, nearly level phase. Included with this soil are some small level areas.

Use suitability.—This soil can be planted to the same crops as Sharkey clay, nearly level phase, but its coarser surface layer makes it easier to till. Also, cotton yields more and is a little more reliable crop on this soil. Drainage is normally necessary, and nitrogen fertilizer will increase yields of cotton, corn, and oats. This soil is in capability unit 8 (II-4).

Sharkey-Clack soils, nearly level phases ($\frac{1}{2}$ to 3 percent slopes) (Sh).—The small areas of these soils normally occur along or close to the Sunflower River or along channels of former large streams. This group, or complex, of soils may include the nearly level phases of any 1 to all 9 of the following series—Sharkey, Alligator, Tunica, Forestdale, Dundee, Dubbs, Bosket, Beulah, and Clack. The fine-textured soils of the slack-water areas predominate, but spots of sandier and, in many places, droughty soils are scattered throughout the mapping unit. In many places the kind of soil changes within a few feet. Therefore, any one area may contain various kinds of soils.

The surface layer ranges from the very dark grayish-brown clay of the Sharkey soils to the light brownish-gray fine sandy loam of Beulah and Clack soils. The subsoil ranges from mottled dark-gray clay of the Sharkey soils to the mottle-free light yellowish-brown sandy loam and loamy sand of Beulah and Clack soils.

Use suitability.—These soils, mostly Alligator and Sharkey clays, are managed the same as Alligator and Sharkey clays that have been mapped separately. Drainage is needed, and nitrogen fertilizer should be added for cotton, corn, oats, and market vegetables. Some of the soils have been planted to pasture recently. Many areas are too small to be managed separately, so they are planted to the same crops as the surrounding soils. These soils are in capability unit 11 (III-4).

Sharkey-Clack soils, gently sloping phases (3 to 7 percent slopes) (Sk).—This complex of soils occurs more

frequently than the complex of Sharkey-Clack soils, nearly level phases. This complex, like the nearly level complex, occurs along or close to the Sunflower River, or along channels of former large streams. The gently sloping phases of any 1 or all 8 series—Sharkey, Alligator, Forestdale, Dundee, Dubbs, Bosket, Beulah, and Clack—may be in a mapping unit. The kind of soil may change within a few feet, so a given area may contain several different soils. The fine-textured soils of the slack-water areas predominate, but spots of sandier soils, many of them droughty, are scattered throughout the complex.

The surface layers range from the very dark grayish-brown clay of the Sharkey soils to the light brownish-gray fine sandy loam of the Beulah and Clack soils. The subsoils range from the mottled dark-gray clay of the Sharkey soils to the mottle-free light yellowish-brown sandy loam and loamy sand of Beulah and Clack soils. Included are some small areas that have lost more than 25 percent of their surface horizon through erosion.

Use suitability.—Contour tillage is almost impossible because of the irregular slopes. The poor tilth of the clayey areas is undesirable for row crops. Oats and pasture are commonly grown on these soils. They are in capability unit 11 (III-4).

SOUVA SERIES

In the Souva series are somewhat poorly drained, slightly acid to medium acid soils. The dark-gray to pale-brown surface layer is underlain by a mottled, dark-brown to light brownish-gray silty clay loam subsurface layer. These soils are derived largely from alluvium washed down from the surrounding Bosket, Dubbs, and Dundee soils. They occur in depressions, and they are frequently flooded after heavy rains. Surface drainage is needed in some places. In this county the surface layer is both silty clay loam and silt loam. Therefore, in the only mapping unit, Souva soils, both surface textures are mapped.

Souva soils (0 to 1 percent slopes) (Sm).—The few areas of Souva soils are somewhat poorly drained, are slightly acid to medium acid, and have surface layers of silty clay loam and silt loam. The parent material is mostly local alluvium washed or sloughed down from surrounding Bosket, Dubbs, and Dundee soils. These soils have slow to very slow surface runoff and moderately slow to slow internal drainage. They occur in shallow depressions in long, narrow former stream channels that are scattered through tracts occupied by moderately well drained and well drained silt loams and sandy loams. The mapping unit has surface layers of both silty clay loam and silt loam texture so close together that it was not practical to map them separately.

Modal profile of Souva silt loam from a cultivated dry field (SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 8, T. 19 N., R. 4 W.):

- 0 to 5 inches, light brownish-gray (10YR 6/2) silt loam; friable; medium acid; silty clay loam texture and dark-gray to pale-brown color in some places.
- 5 to 19 inches, light brownish-gray (10YR 6/2) silty clay loam mottled with gray, yellow, and brown; friable; medium acid; dark brown to light brownish gray in some places.
- 19 to 48 inches +, gray (10YR 6/1) silty clay loam mottled with gray, yellow, and brown; friable; slightly to medium acid; silty clay texture and dark-gray color in some places.

Use suitability.—If this soil is adequately drained, it is productive because fertile soil material washes onto it from higher surrounding soils. Plant roots penetrate the

surface layers readily; they reach into the subsoil fairly readily if the water table is not too high. Cotton is the chief crop, but corn also grows well. Local floodwater needs to be drained off quickly by open ditches. This is not always practical for small areas of Souva soils only, but if surrounding areas will benefit also, drainage may be worth while. This soil is in capability unit 10 (IIw-3).

SWAMP

Swamp (Sn).—This is a miscellaneous land type that occurs on the beds of streams or lakes that no longer receive a regular flow of water. Usually there is 18 inches to several feet of clayey sediments that were deposited from still waters, and under these, sandy sediments dropped from fast-moving waters. The land is flooded most of the year and is covered with a thick growth of trees, bushes, and swamp vegetation. If the land is cleared and drained, it resembles the Dowling soils.

This land is best used for timber and wildlife. Some of it occurs in each of the four general soil areas shown on the colored map at the back of this report.

TUNICA SERIES

In this county the one soil of the Tunica series is somewhat poorly drained, medium to slightly acid, very dark grayish brown, and plastic. The parent material was fine, dark alluvium washed in by the Mississippi River. This soil is similar to the associated Sharkey soils but has a silty clay loam or sandy clay loam subsoil, 20 to 30 inches deep, instead of the clay subsoil of the Sharkey soils. This Tunica soil occurs at higher elevations than the other slack-water soils and also has better drainage.

Tunica silty clay, nearly level phase ($\frac{3}{4}$ to 3 percent slopes) (Ta).—This is a somewhat poorly drained, medium to slightly acid soil. It occurs on the highest elevations in tracts where the Sharkey soils predominate. This soil resembles the associated Sharkey soils but has a silty clay loam to sandy clay loam subsoil, whereas the Sharkey soils normally have a clay subsoil more than 5 feet thick.

Modal profile from a cultivated field:

- 0 to 4 inches, very dark grayish-brown (10YR 3/2) silty clay; plastic, firm, very hard; slightly acid.
- 4 to 26 inches, very dark gray to very dark grayish-brown (10YR 3/1 to 3/2) clay faintly mottled with gray and brown; very plastic, very firm, very hard; massive when wet; weak angular to subangular blocky structure when dry; slightly acid.
- 26 to 32 inches, dark-gray (10YR 4/1) silty clay to silty clay loam prominently mottled with pale brown and yellowish brown (10YR 6/3 and 5/6); plastic, firm, very hard; massive when wet, weak angular to subangular blocky structure when dry; slightly acid.
- 32 to 42 inches +, brown (10YR 5/3) friable silty clay loam or sandy clay loam that is faintly to distinctly mottled; massive.

Small areas that have clay surface layers were included in some areas of this soil.

Most of this soil has been cleared of a luxuriant growth of hardwoods, brush, vines, briars, and canes and is now used for crops. Cotton is the chief crop, but small grains, corn, soybeans, annual hay, and pasture are also grown. This soil is productive but, because it has a silty clay surface layer, it must be cultivated fairly soon after rain. Some drainage is needed, and nitrogen fertilizer should be added for best yields of cotton or corn. This soil is in capability unit 6 (IIs-2).

WAVERLY SERIES

The Waverly soils are poorly drained and medium to strongly acid. They occur in the depressions in association with Dexter, Pearson, and Brittain soils. They have formed mostly from alluvium that washed down from surrounding silty soils. These poorly drained soils are flooded by water that flows down from surrounding higher land after heavy rains. Only one soil of this series, Waverly silt loam, local alluvium phase, occurs in this county.

Waverly silt loam, local alluvium phase (0 to 1 percent slopes) (Wa).—This soil occurs in fairly long, narrow bands in depressions scattered throughout the tracts occupied by soils of the Dexter, Pearson, and Brittain series. It is a poorly drained, medium to strongly acid soil. It developed mostly from local alluvium that washed or slid down from the surrounding silty soils.

Modal profile from a moist cultivated field (center of SW $\frac{1}{4}$ sec. 31, T. 20 N., R. 5 W.):

- 0 to 6 inches, pale-brown to grayish-brown (10YR 6/2 to 5/2) friable silt loam mottled in places with yellow or brown; medium acid; contains many small dark concretions.
- 6 to 32 inches +, light-gray, grayish-brown, and pale-brown (10YR 7/1, 5/2, and 6/3) friable silty clay loam; distinctly mottled; massive; medium acid; in many places the material below a depth of 18 inches is a silty clay.

Included with this soil are many areas that have a silty clay loam, rather than a silt loam, surface layer.

Use suitability.—Areas of this soil are normally the most fertile in the field because they have accumulated fertile soil material from surrounding soils. Production of row crops is uncertain, however, because of low position and poor drainage. This soil occurs in depressions that are part of the natural drainage pattern, and they can be used to advantage as sites for secondary and primary drainage ditches. This soil is in capability unit 15 (IIIw-13).

Genesis, Morphology, and Classification of soils⁴

Factors of Soil Formation

Soil is a function of climate, living organisms, parent materials, topography, and time. The nature of the soil at any point on the earth depends upon the combination of these five major factors at that point. All five of these factors come into play in the genesis of every soil. The importance of each differs from place to place; sometimes one is more important and sometimes another. In extreme cases one factor may dominate in the formation of the soil and fix most of its properties, as is common when the parent material consists of pure quartz sand. Little can happen to quartz sand, and the soils derived from it usually have faint horizons. Even in quartz sand, however, distinct profiles can be formed under certain types of vegetation, provided the topography is low and flat and a high water table is present. Thus, for every soil, it is the past combination of the five major factors that is of first importance to its present character.

⁴ Much of the material in this section was taken, with modification, from the Soil Survey of Tunica County, Mississippi (?).

Climate

The climate of Sunflower County is the humid, warm-temperate, continental type characteristic of the south-eastern United States. The average temperatures and rainfall distribution by months are indicated in table 1. Over the county, climate has been a uniform factor in soil development, but it has made only a slight impression on the soils.

As a rule regions with humid, warm-temperate climates have strongly weathered, leached, acid soils of low fertility. The flood plain of the Mississippi River, however, is geologically young. Time has not yet permitted strong weathering of the sediments in place. The sediments themselves have come, in large part, from sections where weathering is not intense. Thus, the kinds of soils normally associated with warm-temperate, humid climates do not occur in Sunflower County, though they are present within short distances to the east and west. The soils of this county resemble those common in cooler and slightly drier climates.

Living organisms

Before the county was settled, the native vegetation was most important in the complex of living organisms that affect soil development. The activities of animals were seemingly of minor importance. The first settlers found a cover of dense forests broken by occasional canebrakes. Heavy stands of cypress filled the swampy areas, but hardwood stands grew in most of the better drained soils and in many of the wet ones. The trees on the low ridges were chiefly hickory, pecan, post oak, blackgum, and winged-elm. In the swales and low places that were wet but not swampy, the principal trees were tupelo-gum, sweetgum, soft elm, green ash, hackberry, cottonwood, overcup oak, and willow oak. Canebrakes covered many of the broader flats between the swamps in the sloughs and bayous. These different types of native vegetation seem to be associated mainly with variations in drainage. Only the major differences in the original vegetation are reflected to any extent in the soils, probably because of the general youth of the land surface.

With the development of agriculture in Sunflower County, man has become important to the future direction and rate of soil development. The clearing of the forests, the cultivation of the soils, the introduction of new plant species, the building of levees for flood protection, and the artificial improvement of natural drainage will be shown in the direction and rate of soil genesis in the future. Few results of these changes can as yet be seen. Some will probably not be evident for many centuries. The complex of living organisms affecting soil genesis in Sunflower County has been drastically changed, however, as a result of man's activities.

Parent materials

Alluvial sediments laid down by the Mississippi River are the chief parent materials of soils in this county. The total thickness of alluvium in Sunflower County ranges from many tens to several hundreds of feet.

The alluvium in Sunflower County is composed of particles of many different types of rocks, since it originated in the wide reaches of the upper Mississippi River basin. Sedimentary rocks are most extensive in this upper basin, which extends from Montana to Pennsylvania, but other

kinds of rocks are also exposed and serve as sources of sediment in many places. Immense areas in the upper basin are mantled by recent glacial drift and loess. The alluvium along the lower stretches of the Mississippi, including Sunflower County, has come from the multitude of soils, rocks, and unconsolidated sediments of some 20 States. As a result, the alluvium consists of a mixture of minerals. Furthermore, many of the minerals are comparatively fresh and but slightly weathered.

Within Sunflower County there are wide ranges in the texture of the alluvium because of differences in deposition. All of the alluvium has been laid down by river water, either when quiet or in flood. As the river overflows its channels and the water spreads out over the flood plain, the coarser sediments are dropped first. Sands are commonly deposited in bands parallel to and near the channel. Low ridges thus formed are known as natural levees. As the floodwaters continue to spread, they move more slowly and finer sediments, such as silts, are deposited next, usually in mixture with some sands and clays. When the flood has passed and water is left standing in the lowest parts of the flood plain, the finest sediments, or clays, may settle out. These so-called slack-water clays do not settle until the water becomes still.

The simple pattern of coarse sediments near the channel, fine sediments in slack-water areas some distance away, and medium-textured sediments between the two, is common along the numerous old stream channels scattered throughout the county. Over the centuries large stream channels have migrated back and forth across much of the flood plain, sometimes cutting out natural levees laid down earlier, sometimes depositing sand on top of slack-water clays. The normal pattern of sediment distribution from a single channel has been partly or wholly truncated in many places, and beds of alluvium have been superimposed. All possible combinations of sediments resulting from the superposition of the simple patterns, one upon another, now exist in the flood plain. Fragments of former channels with their adjacent sandy natural levees, the very gently sloping bodies of medium-textured sediments, and slack-water clays can be found in a number of places. On the whole, the large areas of slack-water clays have been stable, partly because they lie farthest from the meander belt established by the river channel in the central part of the broad flood plain.

Textural differences in the alluvium are accompanied by some differences in chemical and mineralogical composition. Sandier sediments are usually higher in quartz than are those of intermediate or fine textures. Conversely, they are lower in feldspars and ferromagnesian minerals. Sandier sediments characteristically have more silica and are lower in bases. They are also lower in carbonates for the most part, but that is not always true.

Topography

Sunflower County is a small part of an immense, nearly level flood plain. The topography ranges from the flat bodies of slack-water clays to a gently sloping succession of ridges and swales in areas that once bordered large stream channels. Local differences in elevation are commonly measurable in feet. Seldom are there differences as great as 15 feet within 1 square mile. Slopes are generally less than 3 percent in gradient. Greater slopes occur on a few streambanks. The total area of strong slopes in the county is negligible.

The flatness of the county contributes to the slow drainage of many of the soils. Water moves into the main channels with difficulty, especially from the areas of slack-water clays. Also the slow movement of water through these soils aggravates drainage problems.

Time

Geologically, soils of the county are young. Even now some areas receive fresh sediments frequently. It seems probable that the sediments now forming the land surface in Sunflower County arrived during and after the advances of the Wisconsin glaciers, the latest of which was moving into the North Central States 11,000 years ago. The soils being formed on glacial drift of the Mankato stage (last of the Wisconsin glaciers) in those States show little horizonation other than the downward leaching of carbonates and the accumulation of organic matter in the surface layer. The present surface of the Mankato drift has probably been exposed for 8,000 years. Assuming that rates of horizon differentiation in the alluvium of Sunflower County would be as rapid as that on Mankato drift, the soils could be somewhat older than those of south-central Minnesota. Even so, the comparison indicates that the time span for the development of horizons in the soils of Sunflower County has been short.

Morphology and Composition of the Soils

Soil morphology in Sunflower County is expressed generally by faint horizons. Some of the soils do have one distinct, or prominent, horizon, but they are in the minority. None of the soils has prominent horizons within the solum. Marked differences in texture between the solum or the C horizon and an underlying D horizon occur in some profiles, as, for example, in the Tunica soils formed from thin beds of clay over sand. Generally speaking, horizon differentiation is in the early stages or has scarcely started, and the horizons themselves are indistinct.

The differentiation of horizons in soils of the county is the result of one or more of the following processes: Accumulation of organic matter; leaching of carbonates and salts more soluble than calcium carbonate; translocation of silicate clay minerals; and reduction and transfer of iron. In most soil profiles in the county, two or more of these processes have operated in the development of horizons. For example, the first and the last are chiefly responsible for the morphology of Sharkey clay. All four processes have operated to some extent in the differentiation of horizons in Dundee soils.

Some organic matter has accumulated in the uppermost layer of most soils in Sunflower County to form an A_1 horizon. Much of that organic matter is in the form of humus. The quantities are very small in some soils but fairly large in others. Soils such as Beulah fine sandy loam have faint and thin A_1 horizons, low in organic matter at best. Other soils, such as Iberia clay, have an evident, thick A_1 horizon fairly high in organic matter. Taking the soils of the county as a whole, the accumulation of organic matter has been most important among processes of horizon differentiation.

Leaching of carbonates and salts has occurred in all soils of the county, although it has had limited effect on horizon differentiation. The effects have been indirect, in that the leaching permitted the subsequent translocation of

silicate clay minerals in some soils. Carbonates and salts have been carried completely out of the profiles of most of the well-drained soils. Even in the wettest soils, some leaching is indicated by the absence of carbonates and by the acid reactions. Leaching of the very wet soils is slow because water moves slowly through the profile.

Translocation of silicate clay minerals has contributed to the development of horizons in relatively few soils in the county, mainly the Dubbs, Dundee, and Bosket. Darker coatings on ped faces and clay films in former root channels in the B horizon of these soils indicate some downward movement of silicate clay minerals from the A horizon. The actual amount of clay movement has been small, but it has contributed to horizon differentiation. In the Dubbs, Dundee, and Bosket soils, translocation of clay has been about as important as the accumulation of organic matter in horizon differentiation. Leaching of carbonates and salts from the upper profile seems to be a necessary prelude to the movement of the silicate clays.

The reduction and transfer of iron have occurred in all of the very poorly drained, poorly drained, and somewhat poorly drained soils. It has also occurred to some extent in deeper horizons of moderately well drained soils, such as Dundee very fine sandy loam. In the large areas of naturally wet soils in Sunflower County, the reduction and transfer of iron, a process often called gleying, has been of importance in horizon differentiation.

The gray colors in the deeper horizons of the wet soils indicate the reduction of iron oxides. This reduction is commonly accompanied by some transfer of the iron, which may be local or general in character. After it has been reduced, iron may be removed completely from some horizons and may even go out of the soil profile. More commonly in Sunflower County, iron has moved a short distance and stopped either in the horizon of its origin, or in a nearby horizon. Iron has been segregated within deeper horizons of many of the soils to form yellowish-red, strong-brown, or yellowish-brown mottles. Iron has also been segregated into concretions in deeper profiles of some soils.

The differentiation of the A_1 horizon from the deeper horizons in poorly drained soils of Sunflower County is caused in part by the reduction and transfer of iron. Horizon differences also result in part from a greater accumulation of organic matter in the surface layer. The effects of gleying—the reduction and transfer of iron—are evident but not prominent in the profiles of the soils in Sunflower County generally. This seems to reflect the youth of the land surface and of the soils. The time during which the sediments have been subject to horizon differentiation has not yet been long enough to permit the development of prominent horizons.

Classification of Soils by Higher Categories

Soils are placed in narrow classes so that knowledge of their behavior within farms or counties can be organized and applied. They are placed in broad classes for study and comparison of large areas, such as continents. In the comprehensive system of soil classification followed in the United States (1), the soils are placed in six categories, one above the other. Beginning at the top, the six cate-

gories are order, suborder, great soil group, family, series, and type. Table 6 classifies the soil types of the county by series, great soil groups, and orders.

In the highest category, all the soils of the United States are grouped in only three orders, whereas thousands of soil types are in the lowest category. The suborder and family categories have never been fully developed, have been little used, and are not shown in table 6. Attention has largely been given to the classification of soils into soil types and series within counties or comparable areas and to the subsequent grouping of series into great soil groups and orders. The nature of the soil series and soil type is discussed in another section, Soil Survey Methods and Definitions. Subdivisions of soil types into phases, so as to provide finer distinctions significant to soil use and management, are also discussed in the same earlier section.

TABLE 6.—*Classification of the soils of Sunflower County*

ZONAL SOILS		
Great soil group	Series	Type
Gray-Brown Podzolic	Bosket	Bosket very fine sandy loam.
	Dexter	Dexter silt loam.
	Dubbs	Dubbs very fine sandy loam.
		Dubbs silt loam.
	Dundee	Dundee very fine sandy loam.
		Dundee silt loam.
	Pearson	Dundee silty clay loam. Pearson silt loam.
INTRAZONAL SOILS		
Humic Gley	Iberia	Iberia clay. Forestdale very fine sandy loam.
	Forestdale	Forestdale silt loam. Forestdale silty clay loam. Forestdale silty clay.
Low-Humic Gley	Alligator	Alligator silty clay loam. Alligator silty clay. Alligator clay.
	Dowling	Dowling soils, overwash phases. Dowling clay.
	Waverly	Waverly silt loam.
	Brittain	Brittain silt loam.
Grumusol	Sharkey	Sharkey silty clay loam. Sharkey clay.
AZONAL SOILS		
Regosol	Beulah	Beulah fine sandy loam.
Alluvial	Tunica	Tunica silty clay.
	Souva	Souva soils.

The classes in the highest category of the classification scheme are the zonal, intrazonal, and azonal orders (1). The zonal order comprises soils with evident, genetically related horizons that reflect the predominant influence of climate and living organisms in their formation. The intrazonal order is made up of soils that have evident, genetically related horizons that reflect the dominant influence of a local factor of topography, parent materials, or time over the effects of climate and living organisms. The azonal order consists of soils that lack distinct,

genetically related horizons, commonly because of youth, resistant parent material, or steep topography.

Zonal Soils

The soils considered zonal are the Bosket, Dexter, Dubbs, Dundee, and Pearson. The horizons in those soils are evident but more nearly faint than distinct. They are genetically related and seem to reflect the influence of climate and living organisms, although the effect of time is also important. The five series fall barely within the zonal order and may be looked upon as intergrades to the azonal order.

These five series are tentatively classified in the Gray-Brown Podzolic group, although there is evidence for placing them in the Prairie group as well. Gray-Brown Podzolic soils have a thin, dark A₁ horizon over a light brownish-gray and often platy A₂ horizon. The A₂ horizon is underlain by a brown to yellowish-brown, finer textured B horizon that grades to a lighter colored and usually coarser textured C horizon.

Prairie soils have a thick, dark grayish-brown to very dark brown A₁ horizon grading to a brownish B horizon, which may be mottled. The B horizon grades, in turn, to a lighter colored and usually coarser textured C horizon.

Both the Gray-Brown Podzolic and the Prairie great soil groups normally occur under a humid cool-temperate climate, the Gray-Brown Podzolic under deciduous forest, and the Prairie under tall prairie grasses.

The Bosket, Dexter, Dubbs, Dundee, and Pearson soils lack a distinct A₂ horizon, but all areas of the soils have been disturbed through cultivation. Consequently, it seems highly probable that the plow layer now includes former thin A₁ and A₂ horizons. The soils clearly lack a thick, dark A₁ horizon and do not appear to have had one in the past.

The present character of the B horizon, using the Dubbs profile as an example, would permit classification of at least three series—the Dubbs, Dundee, and Pearson—in either of the two great soil groups. The apparent absence of a thick A₁ horizon, and the probability that the A₁ and A₂ horizons have been mixed by plowing, is used as a basis for placing the soils in the Gray-Brown Podzolic group. It should be recognized, however, that all five series to some extent intergrade to the Prairie soils, and that some are almost as much like Prairie soils as they are like the central members of the Gray-Brown Podzolic group.

Intrazonal Soils

Soils of the intrazonal order are by far the most extensive in Sunflower County. In this order are the Alligator, Brittain, Dowling, Forestdale, Iberia, Sharkey, and Waverly series. All of these are very poorly drained, poorly drained, or somewhat poorly drained. None seems to have distinct horizons, but all show the effects of gleying and of accumulation of organic matter. These soils either are members of, or are closely related to, the hydromorphic groups.

The Alligator, Brittain, Dowling, Forestdale, and Waverly soils have been classified as Low-Humic Gley soils. They are excluded from the Humic Gley group by their lack of a thick A₁ horizon containing much organic matter. The Low-Humic Gley great soil group was

proposed initially for somewhat poorly drained to poorly drained soils lacking a prominent A₁ horizon but having strongly gleyed B and C horizons that show little difference in texture. The Low-Humic Gley great soil group is differentiated from the Humic Gley (Wiesenboden) group in thickness of the A horizon and in its content of organic matter.

The Alligator, Brittain, Dowling, Forestdale, and Waverly soils are not high in organic matter and do not show the effects of gleying in their morphology. On the basis of present knowledge, they seem appropriately classified as Low-Humic Gley soils. Further studies may indicate that the Alligator and Dowling series are intergrades to Grumusols, because both are closely related to the Sharkey series.

The Iberia soils are classed as Humic Gley, as they have an A₁ horizon and are higher in content of organic matter (8).

The Sharkey clays are tentatively placed in the Grumusol great soil group because they exhibit properties of churning, which is brought about through shrinking, swelling, and cracking. The Grumusol great soil group was proposed (4) for soils dominated by montmorillonitic clays. These soils are typically clay in texture.

Grumusols may have a prominent A₁ horizon, but they lack a B horizon. They have dull colors of low chroma, as a rule, and are not well drained. Sharkey clay has many of the features common to Grumusols. The soil has a dark A₁ horizon, plus evidence of gleying in the deeper horizons, which suggests placement of the series in the Humic Gley group. Laboratory analyses, however, indicate that the content of organic matter in the A₁ horizon of Sharkey clay is appreciably lower than that normal to Humic Gley soils and more nearly comparable to that of a typical Grumusol. Furthermore, the dark A₁ horizon is also common to many Grumusols. Consequently, Sharkey clay is tentatively classified as a Grumusol, grading to the Low-Humic Gley group. Sharkey clay seems more poorly drained than a typical Grumusol, but it is not too wet for operation of the churning and mixing process.

Azonal Soils

Azonal soils are much less extensive in Sunflower County than intrazonal or zonal soils, though the whole area consists of geologically recent alluvium. Nevertheless, all soils classified in the zonal and intrazonal orders are marginal to the azonal order because of their low degree of horizon development. Only the series that lack genetically related horizons, or those in the initial stages of horizon differentiation, are placed in the azonal order.

In the azonal order are soils of the Beulah, Souva, and Tunica series. The Souva and Tunica are classed as Alluvial soils, and the Beulah is classed as a Regosol.

The Souva and Tunica are classed as Alluvial soils, but if drainage is not greatly improved in the future, they can be expected to develop into Low-Humic Gley soils as horizon differentiation continues.

The Alluvial soils in Sunflower County lack distinct horizons because the sediments in which they are developing are so young. Given more time under natural conditions, most of these soils would eventually have had profiles similar to those of the Dubbs, Dundee, and Bosket series. Whether that will now occur in soils under culti-

vation remains to be seen. The regime in which the soils now exist differs greatly from that of their original natural environment. Some of the processes important in horizon differentiation probably will be accentuated and others subdued. Some may progress more rapidly, and others more slowly. The net effect of the change in environment on future development of the soils cannot be forecast as yet with any certainty and may not be apparent for some centuries.

Regosols may be defined as "an azonal group of soils consisting of deep unconsolidated rock (soft mineral deposits) in which few or no clearly expressed soil characteristics have developed" (8). The Beulah series is considered a member of the Regosols, but it is thought of as being strongly intergraded towards the Gray-Brown Podzolic group. There is little difference in color and texture between the horizons of Beulah soils.

Additional Facts about Sunflower County

History and Development

In 1844 Sunflower County was ceded from part of the county of Bolivar. It was named for the Sunflower River, on which were no towns, only a few boat landings. Clayton was chosen unanimously by the Board of Police for the name of the site of the new town and county seat. It was just an area in the wilderness, however.

In 1846 when the Board of Police met at McNutt, that town became the county seat. In 1871 when Sunflower County was divided and a large part became the new county of Leflore, the county seat was moved again to Johnsville, a new town at the junction of Mound Bayou and the Sunflower River. Also, the southern and western limits of the county were extended to include parts of Washington and Bolivar Counties.

In 1882, by popular vote, the county seat was again moved to its present site, Eureka, 4 miles west of the Sunflower River on Indian Bayou. It was later named Belengate, and finally it was given its present name, Indianola, after the Indian Bayou, and in honor of Ola, an Indian maiden. In 1918 an area in the southern part of the county was changed over to Humphreys County (6). The county area now is 693 square miles.

The early settlers, attracted by the higher land along the Sunflower River, came mostly from the hill counties of Mississippi. Much of the early transportation was by way of the river.

Transportation and Public Facilities

Two railroads cross Sunflower County. A line of the Illinois Central passes north and south through the entire length of the county. This line makes a direct connection with Memphis, St. Louis, and Chicago markets to the north, and with Vicksburg and New Orleans outlets to the south. The other railroad, the Columbus and Greenville, passes east and west across the entire county.

Two paved federal highways cross the county, generally parallel to the two railroads. The east-west highway is number 82, and the north-south highway is number 49 W.

A few of the important roads to markets are hard surfaced, but most roads in the county are gravel.

A number of consolidated elementary and high schools are located in the larger communities of the county. Buses furnish transportation, and educational facilities of the county are being improved continually. Sunflower Junior College was founded at Moorhead in 1926.

Churches for various denominations are located throughout the county; the larger ones are in the towns.

Many communities have natural gas, and all have rural mail delivery, electric power, and telephones.

The county has two new hospitals and a health unit maintained by the county. There are larger hospitals in nearby Greenville and Greenwood. Cases of malaria, typhoid fever, and dysentery have been greatly reduced because of education, soil drainage, and insect-eradication campaigns.

The population of the county increased steadily from 16,084 in 1900 to 66,364 in 1930. Then it decreased to 56,031 in 1950 because mechanized farm methods and diversified crops reduced the number of people needed for farm labor.

Industries

Sunflower County is basically an agricultural county and has few industries. Two oilmills crush most of the cottonseed and soybeans produced. There are 4 compresses in the county; and 48 cotton gins, many privately owned, are used on individual cotton plantations.

Three factories operate in the county, a cottonmill, a jutemill, and a brick factory.

Water Supply

The water for towns and communities normally comes from deep wells and is piped to the houses. Some wells are 1,800 feet deep, as at Indianola. Shallow wells supply water for most rural homes and for some livestock. Irrigation water is pumped from the numerous lakes and streams, or from large wells, 90 to 115 feet deep, dug for that purpose.

Agriculture

This section is provided mainly for readers not acquainted with the agriculture of Sunflower County. It tells about land use, principal crops, livestock, farm tenure, and farm equipment. The figures used are from the United States Census of Agriculture.

Land use

Sunflower County has a total area of about 443,520 acres. Practically all of the county is in farms. In 1954 the land in farms was divided by use as follows:

	Acres
Cropland.....	347,329
Harvested.....	299,700
Not harvested and not pastured.....	18,840
Pastured.....	28,789
Woodland.....	49,202
Pastured.....	14,244
Not pastured.....	34,958
Pasture other than woodland and cropland.....	19,694
All other land.....	27,752

According to the census, the area in farms exceeds the total acreage of the county. This results because land in farms was calculated by adding the acreage on the separate farms, although parts of some farms extended into adjoining counties.

From the time of the earliest settlers, cotton has been the chief crop (fig. 10). Other crops are oats, soybeans, corn, hay, rice, and pasture.



Figure 10.—Cotton, the leading crop in the county.

Crops

The principal crops in Sunflower County are cotton, soybeans, corn, oats, rice, and hay (table 7). The acreage in cotton, the leading crop, has fluctuated greatly since 1939. Soybean acreage has increased steadily in the 1939-55 period, but the acreage in corn has decreased sharply. Federal acreage allotments on cotton have accounted for some of the shift in cropping pattern.

Yields of cotton and corn have been low (see table 3), but new crop varieties, new insecticides, improved machinery, and improved management can be expected to bring higher yields.

Soybeans are grown both for seed and hay. Yields vary according to the weather. In wet seasons yields are high, but in dry seasons they are very low. Soybeans are planted mainly as a cash crop, though in dry years a fairly large acreage is cut for hay. In 1954, for example, 16 percent of the soybean acreage was cut for hay.

Oats acreages have been increasing because of restrictions on the acreage of cotton. The average yield of oats in 1953 was almost 44 bushels an acre, but yields of as much as 90 bushels an acre have been reported. Much less labor is needed for growing oats than for cotton, and oats grow well on more kinds of soils than either cotton or corn. Winter wheat and barley produce good yields but are not grown extensively.

TABLE 7.—*Acreage of principal crops*

Crop	1939	1949	1954
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>
Cotton, harvested.....	158, 631	211, 250	143, 140
Corn:			
Harvested for grain.....	81, 903	39, 705	18, 277
Cut for silage.....	(¹)	193	1, 260
Hogged or grazed or cut for fodder.....	1, 100	764	1, 831
Soybeans, for beans.....	731	19, 191	57, 344
Small grains, threshed:			
Oats.....	22, 940	11, 691	36, 618
Rice.....	(¹)	(¹)	6, 117
Hay, cut.....	37, 598	21, 614	21, 782
Alfalfa.....	7, 166	302	231
Annual legumes.....	28, 787	7, 303	12, 835
Lespedeza.....	849	12, 947	4, 430
Other hay cut.....	796	1, 062	4, 286

¹ Data not available.

Almost as much lespedeza is grown as the total of all the other hay crops. In 1953 lespedeza averaged almost 1 ton of high-quality hay per acre. Yields are higher in wet growing seasons than in dry seasons.

Alfalfa has not been planted extensively, but good yields can be obtained if the crop is managed properly. Normally, the soils are acid, so lime is needed for best yields of alfalfa, sweet clover, and red clover. Sweet clover and red clover are seldom grown.

Vetch and wild winter peas (fig. 11) are the principal winter cover crops. They are turned under early in spring. To some extent vetch and winter peas are grown to provide supplemental winter grazing. Some of the acreage in these crops is harvested for seed.

Rice, a comparatively new crop in the county, is well suited to some of the fine-textured soils. The acreage has increased rapidly. In 1953, 6,117 acres of rice was grown, and yields that year averaged 62 bushels an acre. After planting rice for 2 successive years, however, yields decline sharply.

Livestock

Raising of livestock has been encouraged by restrictions on acreage of cotton and by improvements in methods of

pasture management (fig. 11). The number of cattle in the county increased from 15,748 head in 1950 to 33,266 head in 1954. The increase is almost entirely in beef animals, for in 1950 the animals on farms were mostly cows kept by the tenant to provide milk for household use. Many of the beef herds are good grades of Angus, Hereford, or Shorthorn.

Hogs have decreased in number. A total of 25,075 head was reported in 1950 but only 14,521 head in 1954. The decrease in number of hogs is paralleled by a decrease in acreage planted to corn. Most of the hogs are raised by tenants for home slaughter.

Before 1950, there were few sheep in the county. Only 385 head were reported in 1945. In 1954, there were 5,655 sheep on farms, or only slightly fewer than in 1950. In 1954, 25,382 pounds of wool were shorn from 5,141 sheep.

The steady drop in number of work animals reflects the increasing use of power machinery. Most of the farms are completely mechanized. The 1954 census reported 2,900 horses and mules on the farms, a decrease of 3,891 head since 1950. About 80 percent of the work animals are mules.

Pasture

Favorable prices for livestock, acreage controls on cotton, and improvement in methods of managing pasture brought a sharp increase in pasture acreage between 1949 and 1954 (fig. 12). The acreage of improved pasture

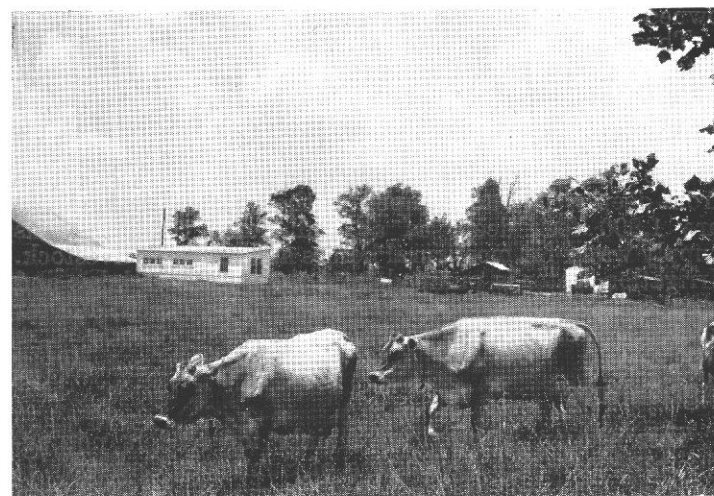


Figure 12.—Dairy cows on class II and III soils; pasture is a mixture of fescue, bermudagrass, dallisgrass, and whiteclover.

slightly more than doubled in that period. The county had 62,727 acres in pasture in 1953. Of this, 28,789 acres was cropland used only for pasture, 14,244 acres was woodland pastured, and 19,694 was other land pastured.

Before 1949, pastures were located for the convenience of the farm operator. The suitability of the soils for pasture was seldom considered. The pastures then provided feed for the mules used to work the land and for the few cows kept to supply milk for the farm family. These poor pastures, and land no longer productive of cotton were fenced, seeded to pasture, and small herds of beef cattle and sheep were turned in to graze.

Fluctuations in prices and acreage allotments will affect the acreage used for pasture. However, these



Figure 11.—A 3-year old sod of fescue and wild winter peas on Sharkey clay.

points favor continued use of pasture: (1) Good growth can be maintained most of the year; (2) most soils produce better if row crops are rotated with pasture sods.

Size and tenure of farms

Since 1950, there has been a marked decline in the number of farms and a definite increase in the average size of farms. In 1954, there were 6,681 farms in the county, or 2,303 fewer than in 1950. In the same period, the average size of farms increased from almost 50 acres to 66½ acres, or 33 percent. The following list prepared from the 1954 census shows the number of farms in various size groups, and the percentage of the total number of farms in each of these groups.

Size in acres:	Number of farms	Percentage of total farms in county
Less than 10.....	1, 224	18
10 to 29.....	3, 723	56
30 to 49.....	648	10
50 to 99.....	456	7
100 or more.....	630	9

In 1954, about 11 percent of the farm operators owned their land, 4 percent were part owners, 84 percent were tenants, and 1 percent were managers. Sharecroppers operate most of the large farms under the supervision of managers. In this system, the farm owner, or his manager, furnishes all equipment and work animals and advances credit for food and personal expenses. In return the owner receives from the sharecropper 50 percent of the cotton crop and interest on the money loaned.

Many tenants now rent land and furnish their own equipment and animals. Some tenants pay cash rent. Others furnish equipment and animals and turn over to the owner one-third of the cotton crop and one-fourth of the corn crop.

Farm equipment

In 1954, there were 3,711 automobiles on 2,630 farms; 1,829 motortrucks on 1,370 farms; and 4,260 tractors on 1,480 farms. This means that about 38 percent of the farms had automobiles and that smaller percentages had trucks and tractors. The land is favorable for tractor farming, and most of the large farms use tractors exclusively.

In 1954, 95 percent of the farms had electricity, as compared to 68 percent in 1950. Telephones were reported on 817 farms in 1954, as compared to 364 farms in 1950.

Soil Survey Methods and Definitions

The scientist who makes a soil survey examines the soils in the field, classifies them in accordance with the facts that he observes, and draws their boundaries on an aerial photograph or other map.

FIELD STUDY.—The soil surveyor bores or digs many holes to see what the soils are like. The holes are not spaced in a regular pattern; they are located according to the lay of the land. Normally the borings are not more than a quarter of a mile apart, but in some areas they are much closer. In most soils such a boring, or hole, reveals several distinct layers, called horizons, which collectively are known as the soil profile. Each layer is studied to see how it differs from others in the profile and

to learn things about the soil that influence its ability to grow plants.

Color is normally related to the amount of organic matter. The darker the surface soil, as a rule, the more organic matter it contains. Streaks and spots of gray, yellow, and brown in the lower layers generally indicate poor drainage and poor aeration. Colors are given in descriptive terms, such as "dark grayish brown." Following the word description is a Munsell color notation, for example, 10YR 4/2, which corresponds to the term "dark grayish brown." Munsell notations are a means of recording color more accurately than possibly can be done in words. Such notations are useful to those who must make fine comparisons of soils; they can be ignored by most readers.

Texture, or the content of sand, silt, and clay, is determined by the way the soil feels when rubbed between the fingers, and it is later checked by laboratory analysis. Texture determines how well a soil retains moisture, plant nutrients, and fertilizer, and whether it is easy or difficult to cultivate.

Structure, which is the way the individual soil particles are arranged in larger grains, and the amount of pore space between grains, gives clues to the ease or difficulty with which the soil is penetrated by plants and by moisture.

Consistence, or the tendency of the soil to crumble or to stick together, indicates whether it is easy or difficult to keep the soil open and porous under cultivation. Some terms commonly used for consistence are *friable*, *plastic*, *sticky*, *hard*, *compact*, *tough*, *cemented*.

Other characteristics observed in the course of field study and considered in classifying the soils include the following: The depth of the soil over impermeable layers; the steepness and pattern of slopes and the degree of erosion; the runoff of surface water, movement of water through the soil, and occurrence of a water table in the soil; the nature of the underlying rocks or other material from which the soil has developed; and the acidity or alkalinity of the soil as measured by chemical tests.

Simple chemical tests show how acid the soil may be. The reaction of a soil is its degree of acidity or alkalinity expressed mathematically as a pH value. A pH value of 7 indicates precise neutrality; higher values, alkalinity; and lower values, acidity.

CLASSIFICATION.—On the basis of the characteristics observed by the field survey team or determined by laboratory tests, soils are classified into phases, types, and series. The soil type is the basic classification unit. A soil type may consist of several phases. Soil types that resemble each other in most of their characteristics are grouped into soil series.

Soil type.—Soils similar in kind, thickness, and arrangement of soil layers, and having the same texture in the surface layer, are classified as one soil type.

Soil phase.—Because of differences other than kind, thickness, and arrangement of layers, and in texture of the surface layer, some soil types are divided into two or more phases. Differences in slope, frequency of rock outcrops, degree of erosion, depth of the soil over the substratum, and type of drainage (natural or artificial) are examples of characteristics that suggest dividing of a soil type into phases.

The soil phase (or the soil type if it has not been subdivided) is the mapping unit, or soil, shown on the soil map.

It is the unit that has the narrowest range of characteristics. Use and management practices therefore can be specified for the soil phase more easily than for the soil type, the soil series, or yet broader groups that contain more variation.

Soil series.—Two or more soil types that differ in surface texture, but are otherwise similar in kind, thickness, and arrangement of soil layers, are normally designated as a soil series. In a given area, however, a soil series may be represented by only one soil type. Each soil series is named for the place near which it was first mapped.

As an example of soil classification, consider the Bosket series. This series has only 1 type in Sunflower County, which is subdivided into 2 phases:

Series	Type	Phase
Bosket-----	Very fine sandy loam-----	{ Nearly level phase. Gently sloping phase.

Miscellaneous land types.—Fresh stream deposits or rough, stony, and severely gullied areas that have little true soil are not classified into series, types, and phases. Swamp is a miscellaneous land type in Sunflower County.

Soil complex.—If two or more different kinds of soils are so intricately associated in small areas that it is not practical to show them separately on the soil map, they are mapped together as a soil complex. Dundee-Clack soils, nearly level phases, is a soil complex in Sunflower County.

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SUPPLEMENT TO THE SOIL MAP:

SOILS OF OLD

Series	Relief	Surface runoff	Degree of erosion	Rate of water permeability
Derived from stratified alluvium of fine, medium, and coarse texture:				
Beulah.....	Nearly level to gently sloping.	Slow to medium.....	None to moderate.....	Rapid.....
Bosket.....	Nearly level to gently sloping.	Slow to medium.....	None to moderate.....	Moderately rapid.....
Dubbs.....	Nearly level to gently sloping.	Slow to medium.....	None to moderate.....	Moderate.....
Dundee.....	Nearly level to sloping.	Slow to rapid.....	None to moderate.....	Moderately slow.....
Forestdale.....	Level to sloping.....	Very slow to medium.....	None to moderate.....	Slow.....
Derived mostly from highly silty alluvium:				
Dexter.....	Nearly level.....	Slow.....	None to slight.....	Moderate.....
Pearson.....	Nearly level to gently sloping.	Slow to medium.....	None to moderate.....	Moderately slow.....
Brittain.....	Nearly level.....	Slow.....	None to slight.....	Slow.....

SOILS OF SLACK-

Derived mostly from clayey alluvium:				
Alligator.....	Level to sloping.....	Very slow to medium.....	None to moderate.....	Very slow and slow.....
Iberia.....	Level to nearly level.....	Very slow to slow.....	None.....	Very slow and slow.....
Sharkey.....	Level to sloping.....	Very slow to medium.....	None to moderate.....	Very slow and slow.....
Tunica.....	Nearly level.....	Slow.....	None to slight.....	Slow and moderately slow.

SOILS OF THE

Derived mostly from fine- to medium-textured local alluvium over clayey slack-water deposits:				
Souva.....	Level to nearly level.....	Slow to very slow.....	None, soil accumulates.	Moderately slow and slow.
Waverly.....	Level to nearly level.....	Very slow.....	None, soil accumulates.	Slow.....
Dowling.....	Level to nearly level.....	Very slow.....	None, soil accumulates.	Very slow.....

¹ Applies particularly to the subsurface layer that normally has a slightly finer texture than the layer above.

IMPORTANT CHARACTERISTICS OF SOIL SERIES

NATURAL LEVEES

Drainage	Surface soil	Subsoil ¹
Somewhat excessive-----	Light brownish-gray fine sandy loam, 6 to 8 inches thick.	Brown to light yellowish-brown sandy loam, underlain by sandy loam or loamy sand.
Good-----	Light brownish-gray very fine sandy loam, 6 to 8 inches thick.	Dark-brown to brown sandy clay loam, underlain by brownish sandy loam.
Moderately good to good-----	Grayish-brown to pale-brown silt loam to very fine sandy loam, 5 to 8 inches thick.	Mottle-free or slightly mottled brown to yellowish-brown silty clay loam, underlain by slightly mottled brownish sandy loam.
Somewhat poor to moderately good.	Grayish-brown to pale-brown silty clay loam to very fine sandy loam, 4 to 7 inches thick.	Mottled grayish-brown to yellowish-brown silty clay or silty clay loam, underlain by mottled brownish silty clay loam to loam.
Poor to somewhat poor-----	Light brownish-gray to grayish-brown silty clay to very fine sandy loam, 3 to 7 inches thick.	Mottled and highly mottled gray, light brownish-gray, or grayish-brown silty clay, underlain by grayish silty clay loam or sandy clay loam.
Moderately good to good-----	Pale-brown silt loam, 5 to 9 inches thick----	Mottle-free or slightly mottled dark-brown to yellowish-brown silt loam or silty clay loam, underlain by brownish silty clay loam or silt loam.
Somewhat poor to moderately good.	Pale-brown silt loam, 5 to 8 inches thick----	Mottled yellowish-brown to grayish-brown silt loam or silty clay loam, underlain by mottled brownish silty clay loam or silt loam.
Poor to somewhat poor-----	Light-gray to light brownish-gray silt loam, 5 to 8 inches thick.	Highly mottled, gray to light brownish-gray silt loam or silty clay loam, underlain by mottled grayish silty clay loam or silt loam.

WATER AREAS

Poor-----	Dark grayish-brown to grayish-brown clay to silty clay loam, 2 to 4 inches thick.	Highly mottled gray clay, underlain by mottled gray clay.
Poor-----	Black to very dark gray clay, 2 to 4 inches thick.	Mottled black to very dark gray clay, underlain by highly mottled to mottled, gray to dark gray clay.
Poor-----	Very dark grayish-brown to dark grayish-brown clay to silty clay loam, 2 to 4 inches thick.	Mottled very dark gray to dark gray clay, underlain by mottled dark gray clay.
Somewhat poor-----	Very dark grayish-brown to grayish-brown silty clay, 3 to 4 inches thick.	Mottled very dark gray to very dark grayish-brown clay, underlain by mottled brownish silty clay loam to sandy clay loam.

DEPRESSIONS

Somewhat poor-----	Dark-gray to pale-brown silty clay loam to silt loam mixed patterns. ²	Mottled dark-brown to light brownish-gray silty clay loam, underlain by mottled gray silty clay or silty clay loam.
Poor-----	Pale-brown to grayish-brown silty clay loam to silt loam, in mixed patterns. ²	Mottled light-gray, grayish-brown, and pale-brown silty clay loam, underlain by gray silty clay.
Poor to very poor-----	Very dark gray to light brownish-gray clay to silt loam. ²	Mottled dark-gray clay and silty clay underlain by gray clay.

² Layer varies so much in depth, no depth is given.

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